RAILROAD GAZETTE

FRIDAY, NOVEMBER 8, 1901.

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Contributions

The Barschall Joint.

New York, Oct. 3, 1901.

TO THE EDITOR OF THE RAILROAD GAZETTE.

Insufficient vertical strength under excessive loads appears to be the only objection from an experience of 3½ years with the Barschall joint on the Pennsylvania Lines. As stated in your issue of July 22, 1898, the joints referred to were of too soft steel. Experience in Europe has shown that hard steel is absolutely necessary and gives the best results. As the wheel load in this country is about 50 per cent. greater than in Europe, these joints of too soft steel could not possibly show sufficient vertical strength. This can, however, be secured by:

1. Outer rails of hard steel.
2. Outer rails of the improved shape, *rolled;* these sit closer to the running surface of the main rail, thereby giving the wheels more support inside of the thread and securing smooth riding of worn wheels with false flanges.
3. Increasing the section of the webs of filler and outer rail.
4. Reduction of bolt holes from 6 to 4, leaving more body and substance to web of rail and consequently increasing strength.

Six bolt holes are not necessary, the outer rail deflecting vertically and equally and not making the objectionable lever-like movement under the rolling load, as is the case with other joints. M. BARSCHALL.

Sand Tracks.

Boston, Oct. 25, 1901.

TO THE EDITOR OF THE RAILROAD GAZETTE.

Is there a useful field for the sand track in the United States? It has been talked of more or less since the time, four or five years ago, when you published the first account of its use in Germany for stopping runaway cars in gravity freight yards; and it has been warmly recommended by signal engineers of good judgment; but yet it does not come into general favor. Only one road, so far as I can recall, has gone so far as to spend a single cent in the construction of anything of the kind. This road is the Metropolitan Elevated of Chicago; and if I am correctly informed the experience there has not been particularly encouraging. But in spite of this the idea is, I think, too practical to be lightly abandoned, and I write to you now to recall your readers' attention to the fact that Mr. E. D. Wileman, of the Lake Shore & Michigan Southern, a signal engineer of experience and known for his good judgment, has, in his article printed in your issue of Oct. 11, once more shown the desirability of providing a device of this kind as an adjunct to a derailer.

I do not need to repeat the argument in favor of sand tracks, for the barbarous way in which American railroads every now and then tip over a 60-ton locomotive at a derailer should of itself impel every railroad officer who has any responsibility in this matter to introduce a change. The contrast between this crude procedure, tolerated because it is expected that it will occur only at rare intervals, and the practice in Germany, where, with the sand track, they stop cars without injury or shock every day, is alone enough to give all necessary emphasis to the argument. I speak merely to suggest a variation of Mr. Wileman's arrangement for protecting the sand track from disturbance.

To provide against trouble from wind he would coat the sand with oil. It seems to me that wind is only one of the disturbing elements which will have to be dealt with. Frost is another. This has been mentioned in former discussions of the subject. Sand could not be kept free from moisture, and in cold climates this moisture might easily be sufficient to freeze the mass of sand into a solid block. The scattering of the sand by careless workmen, or by mischievous boys, would very likely be a greater annoyance than either wind or frost. The importance of this element would be directly proportionate to the infrequency of the use of the derailer; and of course no superintendent expects to use his derailers except at exceedingly rare intervals.

To provide against all contingencies the "sand track" should be kept perfectly dry, and should be protected from the depredations of both the feet and the hands of either employees or trespassers; and to accomplish this object I suggest two simple changes in Mr. Wileman's scheme. To provide against moisture, substitute, in place of the sand, small pebbles, say of the size of buckshot; and to protect the mass from outside interference use a covering of extremely thin metal or of waterproof cloth. Either of these coverings could be securely fastened so that it would not be tampered with, while at the same time it would not prevent wheels from sinking into the speed-destroying mass beneath. P. C. H.

The Uses of the Improvement Account.

Weissnichtwo, Oct. 24, 1901.

TO THE EDITOR OF THE RAILROAD GAZETTE.

To a man of an inquiring turn of mind and who "wants to know, you know?" because he has a bit of money invested, the figures given to the public by some able railroad managers are a trifling puzzling. Now, for instance, the President of a line of about 500 miles has just published his first annual report. His road, with the exception of perhaps two years, during which it was under the rigid supervision of the courts, has been known as a pirate. It bought its business or secured most of it by paying rebates, cutting rates and other practices not according to "gentlemen's agreements," or of the "community of interests." But what is troubling me is my interest in the report; the confounded thing makes statements of alleged facts and then gives tables of figures and they don't agree. "The one could I stomach, or the other could I stomach, but the twain are too much for me" and the result is what would probably be diagnosed as "investor's indigestion."

The President tells us his gross earnings for the year were $2,500,000, as against $2,000,000 under his predecessor, and his net was $700,000, against $380,000, claiming an 84 per cent. increase in the net over his predecessor, who, I understand, is an able manager with a fine record. This increase would seem but little short of the marvelous. But is it? Let us look a little at his expenses. He mentions incidentally that he has expended $700,000 and charged it to an "improvement account." Wonderful thing, an improvement account; it's so easy for a juggler to relieve his hard-worked operating expense account. To be sure its use as a garbage receptacle has gone somewhat out of fashion since investors began to analyze railroad reports, but I heard of an operating agent for the bondholders of a road a couple of years ago who, when compelled to rebuild an engine or car that had worn out or had met with a misfortune, charged the cost of doing so to "improvement account." The agent's successor tells me that in spite of alleged net earnings created by dallying with an "improvement account," the first thing he had to do on succeeding to the management, was to call on the bondholders for a large sum to clean up his predecessor's operating debts and "pigeon-holed" claims.

Suppose we do a little analyzing with a view of ascertaining whether our president has been coquetting with an improvement account: Fifty-five miles (in round figures) of new rail, he says, have been laid during the year covered by his report. That would mean 6,050 tons. The ruling price of rails for the year at the mills was $26, which would mean $157,300. Joints, bolts and spikes would cost approximately $450 per mile, or in round figures say $25,000 more, all together footing up the neat sum of $182,300, without considering the freight which would in this case amount to somewhere near $10,000 more. The 55 miles of new would release about 5,170 tons of scrap rail, worth at the outside, I'm told by dealers, $13 per ton, that would give a credit of say $67,210 on the new, leaving the net cost $125,000. As operating expenses were charged with only $19,000 for rail renewals the improvement account must have been touched for at least $106,000 on that item, and the operating expenses correspondingly arbitrarily cut down that amount and why? Rails will wear out and must be renewed.

Let us take next the item of cross ties—they are expensive but necessary. Old ones rot out and new ones must take their places. The President tells us how many he put in, and these we figure must have cost $150,000. Yet his statement shows the cost of tie renewals charged to operating expenses to have been but $80,000, or only about 53 per cent. of the cost of the number of ties he claims to have renewed in his track, without reckoning the ties and timber for switches and sidings, which, he claims, was also bought and used. If one only dared charge all of his operating expenses to improvement, how lovely it would be.

"Improvement account" must have stood good also for the 60 miles of ballast, as our President seems to have charged to repairs of roadway practically 10 per cent. less than his predecessor. In fact, it is somewhat of a poser when he tells us on one page that on assuming charge of the property it "was below the desired standard" and then a few pages further on says that he charged to maintenance of way and repairs of freight cars $100,000 *less* than the previous management. "Maintenance of way" is the pleasure ground of the juggler in railroad accounts. In "Conducting Transportation" there is less chance for adjusting figures.

And now a few words as to our President's balance sheet. I'm something of a figurer myself, but as railroad accounts are somewhat complicated and as the "chartered accountants," judging from their non-committal certificate, were also rather chary of committing themselves too far on the subject, I decided to submit it to one of my friends who is comptroller of a large system. My friend volunteered to drive not only the proverbial "coach and four" through it, but as he put it "a whole funeral procession," and really the latter would under the circumstances seem to be the most appropriate expression. My friend said: "In the income account the gross earnings and operating expenses are included, leaving net earnings from operation $700,000. The amount of interest deducted does not cover the yearly interest by $65,000; therefore, deducting this amount from the surplus, as shown for the year, would leave but $15,000 instead of $80,000." And right here seems a proper place to interject the remark that if the improvement account had not been utilized to relieve the operating expense of the renewals, instead of $15,000 surplus, there would actually have been a formidable deficit. But I will let my friend, the comptroller, continue:

"The balance sheet shows current assets $700,000, current liabilities $800,000, balance of current liabilities $100,000, cash on hand in operating bank account $90,000. The latter sum is not sufficient to meet his pay rolls, which amount to $95,000. By an analysis of the vouchers payable and the pay roll items, of the item of interest due July 1, and of the total expenses shown for the last three months of the year we may easily discover *$300,000 still unpaid in vouchers payable for the three months, or but $7,500 paid on account of supply bills accruing during that time.*" Isn't that pretty hard lines on supply men and other creditors of the operating department of the road? "It will also be noticed there is due from agents and conductors, companies and individuals $270,000, an amount $70,000 in excess of the total gross earnings of the road for the last month of the year." AN AUDITOR.

The New Car Shops of the Pittsburgh Coal Co.

At the time of its organization two years ago the Pittsburgh Coal Company found among its assets some 4,000 railroad cars of 78 different varieties, ranging up from the primitive gondola of 30 years ago, that had undergone repairs at a corresponding number of places according to equally heterogeneous methods. During the weeding out of this equipment and the bringing of the remainder to a standard satisfactory to the railroad companies there was a comparison and analysis of different cars, of their capacity and endurance which led to the design of the standard car of the Pittsburgh Coal Company which has lately been described in the *Railroad Gazette.* (See Aug. 23, p. 588.)

In logical succession the next step of the motive power department of the company was to provide means for the repairing of cars already in existence along standard lines as nearly as possible and for the building of the new standard equipment. The necessity for maintaining railroad cars and providing and maintaining all the pit cars required in the operation of over 100 mines quickly led to the conclusion that the company should have this work done directly under its own supervision at its own shops.

This decision results in the building and repair plant now nearly completed at Montour Junction on the Pittsburgh & Lake Erie Railroad. This location was chosen because it is as nearly central as can be obtained (38 per cent. of the company's cars being operated over the Pittsburgh & Lake Erie R. R., 36 per cent. over the Pennsylvania Lines West of Pittsburgh, and the remainder over the Pennsylvania and Baltimore & Ohio Railroads), and because of the proximity to the Montour Junction and Moon Run Railroads, which the Pittsburgh Coal Company owns and operates, and the equipment for which it intends to build and care for at these shops.

The plant covers five acres. The main building, 60 ft. wide by 300 ft. long, contains at one end the pit car shop, next a forge and at the other end a long room equipped with planers, drills and the other tools essential to a complete modern outfit for working in wood. Adjoining the main building is the power house, 35 x 67 ft., furnished with two 18-ft. x 72-in. boilers from the Erie Iron Works. These carry 150 lbs. pressure and connect with a Harrisburg engine of 150 h.p., which propels an electric generator, furnishing power, heat and light for the entire plant. The erecting shop is 50 x 300 ft. and an adjoining locomotive stable 45 x 125 ft. A two-story building 20 x 60 ft. serves as storeroom and

office, and there is a fireproof vault for records, 20 x 30 ft. Each of the buildings has 22-ft. brick walls and slate roof.

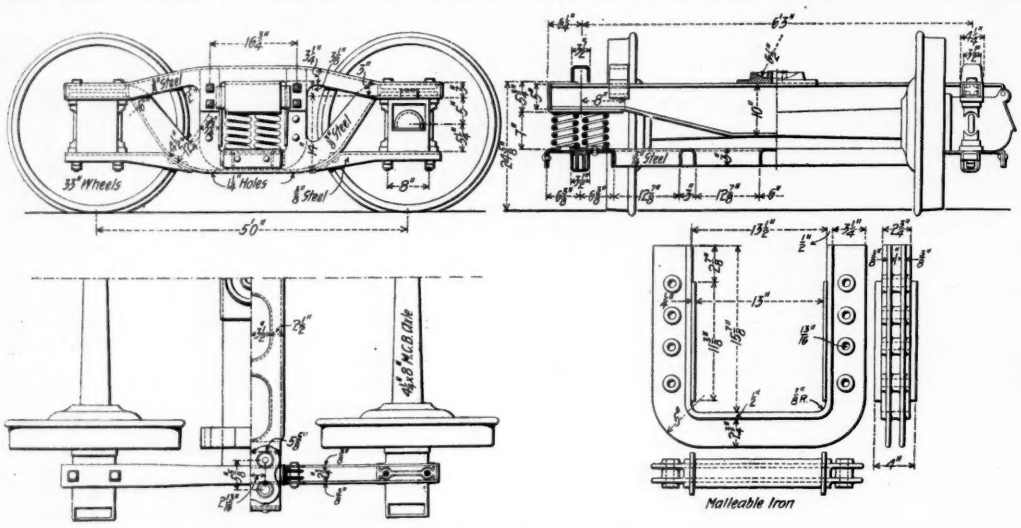
This plant has been built under the supervision of Mr. James E. Simons, Superintendent of Rolling Stock & Machinery of the Pittsburgh Coal Company, who also has charge of the operation of the Montour Junction and Moon Run Railroads. Mr. Simons has appointed N. S. Reeder as shop superintendent and superintendent of the two railroads, and has devised a system of organization and operation. The plant will have a capacity of 30 railroad cars and 500 pit cars a month in addition to that required for current repairs, and when running full will employ 250 men. Repairs to mining machinery and other general repairs incident to the company's operation will be made at these shops.

It is the expectation that examination of the records of different kinds of pit cars and a close study of their service will result in a standard pit car for the mines of the company with interchangeable parts.

A New Pressed Steel Truck—Pere Marquette Railroad.

Mr. B. Haskell, Superintendent of Motive Power of the Pere Marquette Railroad, has designed a new pressed steel freight car truck of the diamond frame type which avoids using separate column guides and long column bolts. The construction is shown by the accompanying engravings.

The side frame consists of an upper arch bar of U section which also includes the upper portions of the column guides, the whole piece being pressed up out of a single plate. The lower arch bar is of similar section, and integral with it are the lower portions of the column guides. A malleable iron filler in the form of a yoke is inserted between the flanges of the arch bars and extends below the spring seat. This filler is held by rivets



Pressed Steel Truck—Pere Marquette Railroad.

through the lower arch bar plates and by bolts through the upper arch bar plates. In the truck shown, the usual long tie bar is replaced by two short steel pieces, each being riveted to the lower arch bars and extending below one of the journal boxes.

The ends of the lower arch bar are made to fit within the flanges of the upper bar and a malleable iron filling piece is inserted at each end. The spring plank is pressed steel and flanged along the sides between the lower arch bars. The flanges of the spring plank engage both the inner and outer flanges of the arch bars, and this overlapping of the flanges, together with the riveting, makes a strong connection. The body of the spring plank is lightened and stiffened by cutting away its metal so as to form four openings, the edges of which are flanged.

The features embodied in this design, and covered by patents, have also been included in a truck having cast-steel side frames. In this case the section of the arch bars is T-shape. Portions of the column girders are cast with each of the arch bars and the guides are joined near the center similar to the construction shown. Both the cast-steel and pressed steel side frames are suitable for use with or without transoms.

Fence Posts of Old Boiler Flues.

In a recent issue of the Proceedings of the Rocky Mountain Railway Club is a short paper on "The Use of Old Boiler Flues for Fence Posts." The paper is by Mr. William Baird, General Car Inspector of the Burlington & Missouri River Railroad, and describes the practice on that road.

It appears that in the year 1900, 12,500 posts were made by the company out of discarded boiler flues, and in the two years preceding 10,000 posts had been made. The company discards from 6,000 to 8,000 flues a year, and some time ago the General Superintendent, Mr. T. E. Calvert, conceived the idea of using these flues for fence posts. The road runs largely through prairie county and it is estimated that about 10,000 wooden posts are burned every year by prairie fires. Obviously, a metal post at anything like the same first cost would be economical not only because it could not be burned, but because of its longer life aside from fires. Experience shows that the flue posts as made by the company cost from 16 cents to 19½ cents each, depending on the scrap value of the old flues. Red cedar posts cost 12½ cents, and oak posts 16 to 16½ cents.

The flues are cut to length and holes are punched for attaching the wire, then they are coated with tar and concrete bases are attached to them. This latter process is carried on in batteries, each containing 48 moulds. The flues are put in the moulds and the concrete poured around, this being made one part cement, three parts sand, three parts stone chips or screened broken stone. The stone used is from about the size of a grain of corn up to a walnut. The plant where this work is done is at Lincoln, Neb., and it is under the supervision of Mr. John T. Rivett.

Report of a Boiler Explosion—Lancashire and Yorkshire Railway.

We gave some account of a locomotive boiler explosion, on the Great Eastern Railway, in our issue of Nov. 16, 1900, p. 759, and we now give some extracts and illustrations, from *The Engineer*, recording a similar accident on the Lancashire & Yorkshire Railway, March 11, between Knottingley and Sudforth-lane. The matter is from the report of Mr. Carlton, who made the Board of Trade investigation:

Description of the Boiler.—The boiler was of the ordinary locomotive type, and was fitted with a Belpaire fire-box. The shell was steel, the fire-box copper, the longitudinal and transverse stays iron, and the fire-box stays of a copper-zinc alloy made by the company. The barrel was formed of two rings of plates, the longitudinal seams of which were double-strapped and double-riveted. The thicknesses of the various parts were as follows: Barrel, outside wrapper and end plates ½ in.; saddle plate, ⅝ in.; smoke-box tube plate, ⅞ in.; inside wrapper plate, ½ in.; back plate and lower part of the fire-box tube plate ⅝ in.; the upper part of the last-named plate where it received the tubes was 1 in. thick.

The roof of the fire-box was supported by wrought iron stays 1⅛ in. in diam., pitched 3⅞ in. longitudinally by 4⅝ in. transversely, the three rows nearest the tube plate being link stays. The stays in the sides and ends of the fire-box were 1 in. in diam., and were screwed with 11 threads per in.; they were reduced in the body to $^{15}/_{16}$ in. in diam., and were pitched barely 4 in. apart; the ends were riveted over. The seams in the fire-box were single-riveted with rivets ⅞ in. in diam., pitched 1⅞ in. apart. The upper parts of the boiler ends were supported by 12 longitudinal stays, and the sides of the outside shell above the roof of the inner box by 24 transverse stays. The foundation ring was made of cast steel; it was single-riveted except at the corners, where it was double-riveted to the outside plates.

The barrel was 4 ft. 10 in. mean diam., and contained 239 steel tubes 2 in. in diam.; the length between the tube plates was 15 ft. A steam dome 1 ft. 10¾ in. in diam. x 1 ft. 10 in. high was attached about the middle of the barrel.

The copper fire-box was 7 ft. 5⅝ in. in length inside at the bottom, and 7 ft. 1¾ in. at the top; the width inside at the bottom was 3 ft. 6 in.; the sides were parallel for a distance of 2 ft. 6 in. from the bottom, above which height the box widened gradually to 4 ft. 2¾ in.; the sides then continued parallel again until they curved into the roof; the inside height was 6 ft. 3¼ in. The external fire-box was 8 ft. 1 in. in length outside, and 4 ft. 1 in. and 5 ft. 1¼ in. in width at the bottom and top respectively. The width of the water space at the lower part of the sides was 2½ in., and at the upper part 4¼ in. The total length of the boiler was 25 ft. 3 in.; it was an unusually large one, and worked at a pressure of 175 lbs. per sq. in.

The usual mountings were provided; the safety valves were of the Ramsbottom type, 3 in. in diam. Two water gages and two injectors were provided. Three fusible plugs were fitted in the copper roof plate—one on the left side near the back, one in the center, and the other at the right side near the tube plate.

Nature of the Explosion.—The explosion was a very violent one; the left side of the copper fire-box with part of the roof-plate separated from the stays, and was blown against the opposite side, the superficial area of the plate torn away being nearly 60 sq. ft. The foundation ring was broken in several places; both sides of the outside shell were bulged—the left side 18 in., the other 5 in., and the back was also bulged.

The engine frames were forced apart, the fastenings being broken; the left trailing wheel was cracked, and the axle, which was 7½ in. in diam., was bent. The boiler was hurled a distance of about 174 ft., and as the engine was traveling tender first, and the outrush of steam chiefly occurred from the left side of the fire-box the boiler took an oblique course in the opposite direction to that in which the engine was going. In its flight through the air it was probably revolving on a transverse axis and struck the ground with great force, crushing in the top of the external shell as well as the part of the copper box that remained standing near the back; many of the unbroken roof stays were bent and distorted by the fall. One of the safety valve chests was broken off and the other mountings were seriously damaged. The driver and fireman were both killed.

Cause of the Explosion.—The explosion was, in my opinion, caused by the failure of a group of stays on the left side of the fire-box, immediately below the brick arch. A few of the stays composing this group had been broken for some time before the explosion took place, the fractures having the discolored appearance that is produced by contact with water; the other stays in the group were partly cracked at the bottom of the threads, the fractures in each case being within the copper plate, two or three threads below the riveted head. Some of the partly fractured stays appear eventually to have failed altogether, and the plate being thus unsupported over a considerable area consequently bulged. The surrounding stays being then unable to sustain the additional load, a number of them failed by having the ends broken off; in others the plate slipped over the ends of the stays. It then ripped away from the forward side and bottom of the box, and a violent explosion ensued.

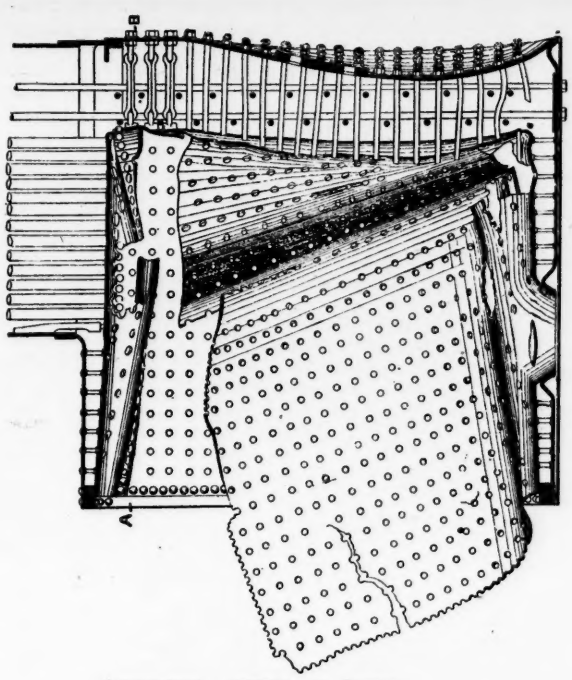
General Remarks.—The boiler was a comparatively new one, the engine to which it was attached having only left the workshop on Aug. 21, 1900. It was built by the Lancashire & Yorkshire Railway Company at Horwich, and was known as No. 676. The company have 40 engines running with boilers similar to this one, the first one having been turned out in February, 1899. Twenty of them are on passenger engines, which have run an aggregate of about 1,000,000 miles; the remainder are on goods engines, four of which were employed in the mineral traffic in the Goole district, and the latter are said to be the only four of this type that have given serious trouble. When No. 676 exploded it had run a distance of only 15,007 miles. When the boiler was completed it was tested in the works by hydraulic pressure to 220 lbs. per sq. in., heated water being used. As, however, the margin above the working pressure was only 45 lbs., such a test can only be regarded as a caulking test, and except as such was of little practical value.

A few months after No. 676 began running leakages from the tube ends and side stays in the fire-box became frequent; these, as a rule, were stopped by re-expanding the tubes and hammering up the ends of the stays. A number of the stays were afterwards found to be defective and were renewed, the following being the particulars of such renewals: Week ending Dec. 15, one stay renewed on the left side of the fire-box. Week ending Dec. 29, one stay renewed on the left side of the fire-box. Week ending Jan. 31, one stay renewed on the right side of the box. Week ending Feb. 21, eight stays were renewed, six on the right side and two on the left; five of these were cracked and three were broken.

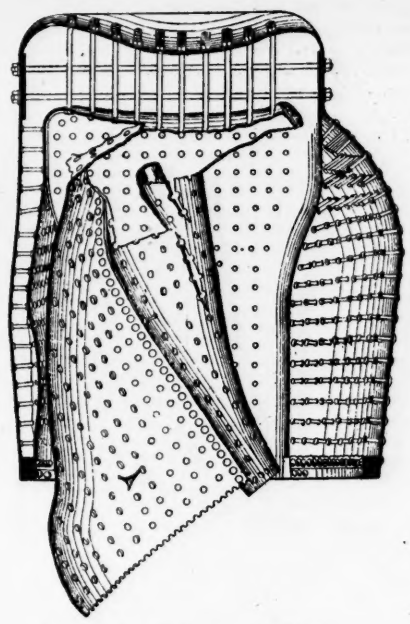
The six stays referred to formed a group, and the plate was bulged. Notwithstanding the above repairs, reports of leakages by the drivers were most frequent, no less than 29 entries referring to leakages from the fire-box having been made in the report book at Goole between Jan. 3 and March 9 inclusive; some of the leakages being described as bad, others as very bad. On Jan. 28 a loaded train was left at Glasshoughton because the driver could not get sufficient steam to start the train owing to leakages in the fire-box. On March 8, at Hemsworth, the number of wagons in the train had to be reduced for the same reason. On Saturday, March 9, the last time the engine was in the shed, a fitter examined the fire-box. He found leakages at some of the tubes and stays—the former he re-expanded; the latter, which were in the middle of each side, he made tight by hammering the ends. He was of opinion that none of them were broken or defective, but in this he would appear to have been mistaken.

The boiler was washed out during the week end, and on Monday following, March 11, the engine was taken out. On the outward journey the fire-box leaked, but improved on the return journey. During this run the safety valves lifted freely, the water gages and feed injectors worked satisfactorily.

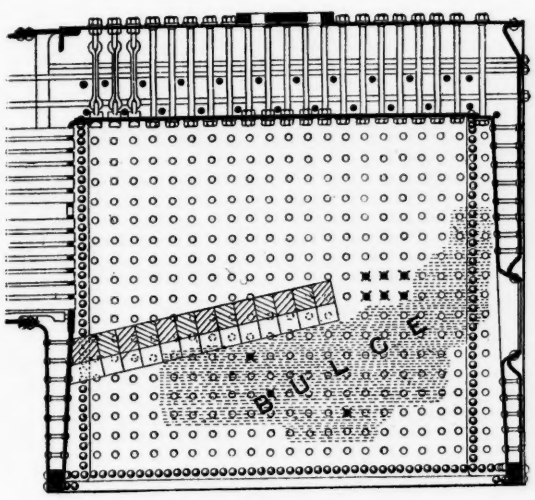
Judging from the appearance of the stay holes, and the general character of the rupture, I am of opinion that the part indicated in the figure was the first to bulge. After the side plate had separated from the whole of the stays, the back plate and tube plate were pulled inwards, and rupture of the plates began. Commencing from each



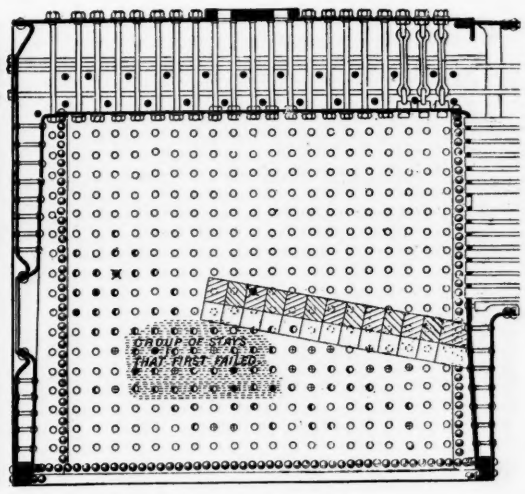
LONGITUDINAL SECTION OF FIREBOX.



TRANSVERSE SECTION OF FIREBOX.

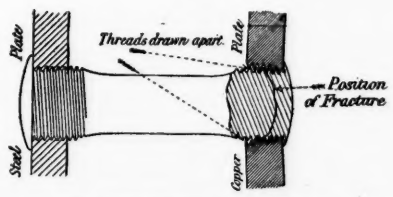


SECTION SHOWING RIGHT SIDE OF FIREBOX.

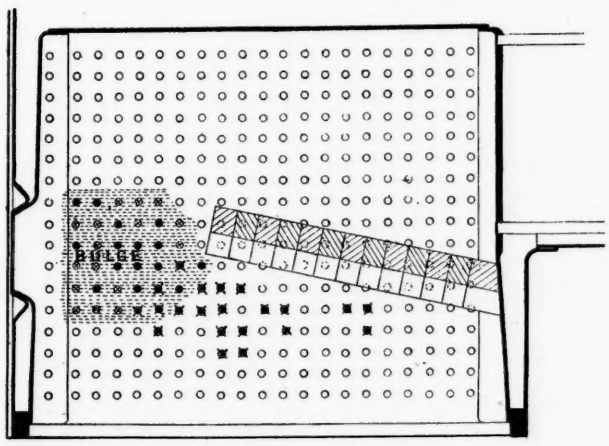


SECTION SHOWING LEFT SIDE OF FIREBOX.

STAYS, MARKED THUS ✕ ARE RENEWED STAYS OF COPPER
" " " ● BROKEN STAYS (OLD FRACTURES) IN FIREBOX
" " " ◐ FLAWED STAYS
" " " ⊕ HAD THE ENDS TORN OFF, THE MATERIAL APPEARED TO BE VERY BRITTLE
THE FRACTURES WERE NEW

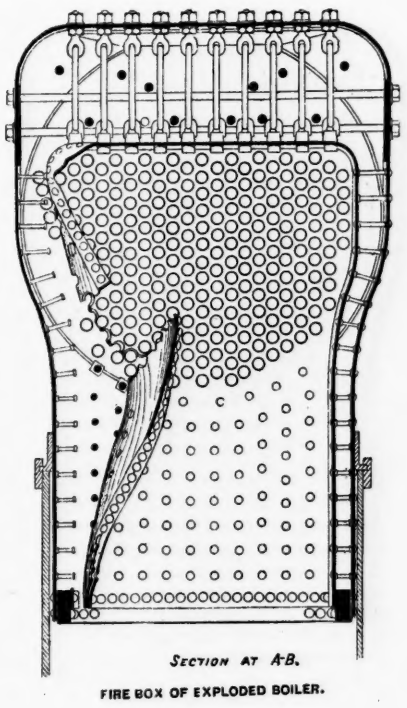


VIEW SHOWING POSITION OF FRACTURES IN STAYS



STAYS MARKED THUS ✕ ARE RENEWED STAYS OF COPPER
" " " ● BROKE IN THE COPPER PLATE AT THE HYDRAULIC TEST
" " " ⊗ PULLED THROUGH THE COPPER PLATE AT THE HYDRAULIC TEST.

TESTED FIRE-BOX.



SECTION AT A-B.

FIRE BOX OF EXPLODED BOILER.

The Knottingley Boiler Explosion—Lancashire & Yorkshire Railway.

top corner of the fire-box on the left side, the roof plate was torn rather more than half way across in two converging lines; the nutted iron stays between the lines of rupture appear to have offered great resistance to fracture; the stays in each row failed simultaneously, and the rows in succession, by the nutted ends being torn off. In this operation the plate was sharply bent as each row failed, forming a longitudinal corrugation, the latter being upwards against the pressure. The holes in the roof plate were elongated transversely, showing clearly the direction of the force that caused the plate to rupture. The side plate about the same instant tore away from the bottom and forward end, fracture at the bottom occurring chiefly through the solid plate where it followed the outline of the rivet heads in the seam, and at the end through the vertical seam of rivets. The ruptured plate was then driven across the box against the opposite side, and was pierced by one of the fire-bar bearers on that side. The part of the roof plate situated between the ruptured portion and the tube plate remained standing, and was found to be perfectly square and uninjured. When the ruptured plate was cut out a large bulge was revealed on the right side, covering an area containing about 90 stays, all of which were broken, the fracture in every case occurring, as far as could be seen, two or three threads below the riveted head within the copper plate. The steel and copper plates were both bulged, in opposite directions; it would therefore appear that these bulges were caused by internal pressure. Had the shock of the impact with the ground caused the bulge, both plates, being tied together, would have gone the same way.

After the explosion the company tested by hydraulic pressure one of the boilers that had been working in the Goole district similar to No. 676. At 485 lbs. the left side bulged between the brick arch and the back plate (See "Tested Fire-box") but the stays immediately forward of the bulge below the arch had been renewed, and it will be observed from the drawings that the area covering the bulged part and the group of renewed stays is strikingly similar in position and shape, not only to the bulge on the right-hand side of the exploded boiler, but also to the area containing the broken and defective stays on the left side, and it should be further noted that the position of the group of renewed stays—which had manifestly been the most defective—corresponds with the group of defective stays in No. 676 boiler, the failure of which I attributed from the first to be the cause of the explosion.

When new the fire-box would probably have withstood a water pressure of not less than 1,100 lbs. per sq. in., whereas when tested six months later it failed at 485 lbs., which is only 44 per cent. of the original strength, and gives a factor of safety of only 2.77, which is far too small a margin for a fire-box, the material of which depreciates as the temperature increases. This feature is one of the utmost importance, though possibly it does not always receive sufficient consideration.

Assuming the plates to have been working at a temperature approaching 700 deg. F. at the hottest part of the sides where overheating and bulging most frequently occur, the tensile strength of the copper would fall about 40 per cent., and the alloy that was used possibly 50 per cent. Reducing the factor of safety obtained at the test the latter amount, it becomes only 1.38, and does not take into consideration the heavy cross-breaking stress that these stays are exposed to, but which is generally recognized. Having regard to these circumstances, this boiler in my opinion, was also unsafe when it ceased working.

The Use of Texas Oil by Railroads.

A month ago a correspondent on a road in the Southwest wrote: "The absorbing topic is fuel oil, and we expect to be using it before many months." Further inquiry shows that a number of roads in the Southwest are seriously considering the use of Texas oil for locomotive fuel, while a few roads now have some oil-burning locomotives in service.

The Kansas City Southern has two locomotives equipped for oil, but these have only been in use a few weeks and not much is known yet about their performance. However, they are said to steam well.

The International & Great Northern has been experimenting with fuel oil in locomotives, and oil-burning passenger, freight and switching engines are now in service and giving good results. It is thought that in the near future all engines on the Gulf Division of this road will be equipped for burning oil. Mr. F. Hufsmith, the Superintendent of Motive Power, says that at present prices there is a saving of about 20 per cent. in favor of fuel oil and roads running directly into the oil fields make a still larger saving, having no freight to pay on the oil. His opinion is that fuel oil will be universally used by the roads in that section of the country if present conditions prevail. Mr. Hufsmith considers the following the chief advantages of oil over coal-burning engines: There is no danger of setting out fires along the right-of-way and no need to clean fires at terminals; there are no cinders to be handled and the annoyance to passengers from cinders and smoke from the locomotive is overcome.

The Gulf, Colorado & Santa Fe has 15 engines converted from coal to oil-burning engines and expects to convert 75 engines as soon as possible. This road apparently has its plans more definitely made than the other Texas lines. The economy in using oil instead of

coal is found to range from 25 to 40 per cent., the latter figure being obtained near the oil fields where the price of coal has been high. The former figure applies near the source of the road's coal supply.

The Southern Pacific expects to equip for oil-burning the locomotives on its Louisiana lines and on its lines in Eastern Texas. The apparatus will be similar to that now used on Southern Pacific locomotives distributed between Oakland, Cal., and El Paso, Texas. With reference to the Pacific System, which has used fuel oil for a number of years, Mr. H. J. Small says that 149 locomotives are now equipped to burn oil.

The Mexican Central has made drawings for oil-burning apparatus suitable for its locomotives, but as yet nothing has been done in the way of changing its engines.

Beside these about a dozen small roads in Texas say that oil fuel will probably be used on their locomotives, if the roads now experimenting with the Texas oil are successful.

A Fine Run to Atlantic City.

Last Saturday Mr. Theodore Voorhees, of the Reading, took Mr. Gibb, of the North Eastern (British) and his party on a special train to Atlantic City and back, leaving Camden about 1:30. The train was hauled by the Vauclain compound Atlantic type engine No. 326, which engine has 84-in. drivers and 2,550 sq. ft. of heating surface. The train was made up of five cars which weighed 210 long tons or 470,400 lbs. behind the tender. The run of 55½ miles was made from start to stop in 46½ minutes, or at the rate of 71.6 miles an hour. There were no stops, but speed was checked three times. During the run 35 miles was covered at 81½ miles an hour, and the fastest single mile was done at 85.7 miles an hour. The last two miles were run to absolute rest in 120½ seconds. The British party included, besides Mr. Gibb, General Manager; Mr. Harrison, Chief Engineer; Mr. Burtt, General Traffic Manager; Mr. Newell, Docks Engineer, all of the North Eastern, and Mr. Norman D. Macdonald, of Edinburgh, who is acting as recorder for this party. On the train were a number of officers of the Reading and their guests.

The M. C. B. Coupler.

Oct. 25 we published extracts from Mr. R. P. C. Sanderson's paper on "The M. C. B. Coupler," presented at the October meeting of the Western Railway Club. What follows is taken from the discussion of that paper:

Mr. C. A. Schroyer (Chicago & North Western) reviewed experiments made about five years ago to measure the lateral pressure of couplers against the carrying irons where a tender was coupled to a 60-ft. passenger car and run around a 12-deg. curve, being the same data as was brought out at the last convention of the M. C. B. Association. A side thrust of 57,000 lbs. was measured in these tests. Following this Mr. Schroyer said: Cars to-day are being handled successfully with the automatic coupler and no provision is made anywhere for lateral movements. There is no place on the North Western road to-day that I know of where special devices are used for getting these cars around curves. We are running 50-ft. cars coupled to 32-ft. cars. We have made it a point in the construction of our cars to keep the trucks as near as possible to the ends of the cars, to reduce lateral movements. So, while I consider that the claims as made by Mr. Sanderson, insofar as these lateral movements are concerned, are all right theoretically, practically cars are running around the curves and they are running around without any perceptible damage anywhere. Of course no one pretends to deny, but that they do have their effects on the car eventually, and while I question very much as to whether it would be best to absorb these lateral movements by means of a swing motion truck, or by means of the lateral play in the yoke or carrier iron, it certainly should be done somewhere.

Mr. F. H. Stark (Cleveland, Lorain & Wheeling).—I can recall how some of the representatives of leading roads labored with this question with a view to agreeing on a uniform coupler, or at least one that would interlock automatically. A great many of these devices were brought out, and quite a few of them were put in service, and I must say that under the existing conditions the present type of M. C. B. coupler is by far the most practical coupler that I have ever seen.

A radical departure in any mechanical device, as a rule, has to be perfected. There may be some weak points in the present coupler, but it is more in the detail than in the principle. A great many of the couplers to-day can be strengthened without change in the general lines. The coupler shank can be more heavily ribbed and under the present improved methods of molding, larger and heavier fillets can be used. Other couplers no doubt need remodeling, and in doing so a great many new features suggested by experience can be embodied in new couplers.

The coupler knuckle lug might be shortened up and increased in section, the automatic lock set could be considered and the link slot dispensed with; all of which are improvements. Hence, we have not exhausted all the means available for betterment of the present coupler. The wholesale criticism of the coupler by Mr. Sanderson is rather characteristic of the man, and I hardly feel that he means it in the full sense. The remedy that he suggests in the way of providing more lateral motion is commendable, but that is by no means the most serious trouble that we have.

In connection with this I would venture this suggestion, that the railroad clubs agitate the subject of a universal coupler of one design; that the elements of strengh as found from experience and from experiments that might be made, all be embodied in one universal coupler. If this could be brought about it would redound to our credit, it would save thousands of dollars in the way of material in stock, it would avoid serious delays to freight, and I believe that nearly all of the coupler makers would be willing to waive all their patent rights and agree on one universal coupler. If this were brought about, it would not end our trouble. We would still have to interest the transportation officials, to treat the much abused freight car with a little more consideration. The average transportation official is loth to increase the cost of switching over that of his neighbor and the cost of freight car repairs is almost lost sight of.

It can hardly be expected that we can construct a car that will withstand the switching service to-day. When we stop to consider loaded cars, with the contents weighing 110,000 lbs., coming together at the common rates of speed, it would be useless to try to construct anything to withstand the shocks, and besides it would be an unnecessary expense. The first cost of construction and the dead weight that would have to be hauled, year in and year out, should be considered. It may take a little time to create sentiment in this direction, but I believe it should be done.

Mr. A. E. Manchester (Chicago, Milwaukee & St. Paul).—The St. Paul has practically all of its cars equipped with swing motion trucks, and when I think of the rapid increase that is taking place in car repairs due to draft attachment, if the swing motion truck is really one of the methods that might avoid that damage, I pity the fellows that have not swing motion trucks. In going into this matter carefully of late I find that since the adoption of the M. C. B. coupler and the getting away from the old cast-iron coupler, that the damage to draft riggings on our equipment has increased four-fold in six years.

I think Mr. Stark sounded the keynote of what is the matter. It is the rough handling of the cars in the yards. A few years ago if cars were thrown together too hard the cast-iron coupler was broken, and there was the tell-tale right away. The switching crew had to explain it. Now they can put the cars together and they can strain the couplers and strain all the bolts and the draft sills and crack the center sills and damage all the freight in the car and still they have not handled the car roughly because they have not broken the coupler, and there is no outward visible sign of anything happening. Among the other defects that have quadrupled is the broken end post. What does the broken end post mean? That the load has shifted, and loads shift from cars being thrown together. I do not believe that we will ever be able to prevent this by strengthening the draft rigging and continue in the rough way of handling cars. As I said, a few years ago, the cast-iron drawbar was the tell-tale. There was also another fact, the men had to go between the cars to make couplings and it was well known by the switchmen and the engineman that if the car came back too fast the man making the coupling would get out of the way and they would have to pull ahead and try again until the cars came together at a safe speed. With the M. C. B. coupler no one goes between the cars.

Mr. Robert Quayle (Chicago & North Western).—In all the tender equipment we have rebuilt or purchased in about six years we have put in almost identically the scheme that Mr. Sanderson has outlined here, except that we do not use the convex follower plate, but instead use filler blocks, that are convex, on each side of the follower plate. This, of course, refers only to our locomotive tenders.

We have had no difficulty whatever in breakages in this form of construction on our locomotive tenders. We have a total of about 5 in. lateral motion or about 2½ in. on each side of the center line, and we consider it to be a very good thing, particularly when a buffet car with about a 12-ft. overhang is coupled to the tender. How many locomotives we have saved from being derailed we do not know, and may not have saved any. But if anything should come up from a legal standpoint we are prepared to say that at least we have made some calculation and adjustment of drawbars in our locomotive tenders to compensate for the required lateral motion in going around curves.

So far as relates to freight cars, I think it is rather a big undertaking to commence now to make all these changes and perhaps is not necessary where the cars are so nearly of uniform length. This proposition, however, could be considered in connection with new equipment were it deemed necessary. I think sometimes it is a good thing not to have too much lateral motion going around curves, because the cars right themselves better than they do with too much lost motion, and this would be particularly true if swing trucks were used.

Mr. C. A. Schroyer (Chicago & North Western).—Insofar as the lateral motion is concerned, I do not believe the lateral play of the coupler is necessary to-day, except in the extremely long cars or the extremely short cars. I believe that in the cars made of pretty nearly a uniform length, no provisions need be made for that feature at all. A very large percentage of the cars in operation to-day are cars of a uniform length in which these points do not apply with the force indicated here. We have some 50-ft. cars that are running right along, but the trucks are as near the ends as we dare put them, and they are running first-rate, as far as we know.

When I looked up the statistics of the cost of maintaining draft gear to-day and compared it with what it was last year and the year before, I found that we could pride ourselves on keeping our cost of maintenance down or under where it was a year previous; that one year compares favorably with the other. Our records of broken couplers show that there is a very small percentage of couplers broken off near the head. That is where the strain comes, and the percentage is very small as compared to the percentage of guard arms that are broken. I want to say, if you look this matter squarely in the face, you will come to the conclusion that the automatic coupler to-day is the result of public opinion; it has been forced on us, and we had to meet the conditions that existed on the cars. Public opinion demanded that something should be used in the coupling of our cars that would do away entirely with the element of danger existing. The doing away with the element of danger has led to the condition of switching that now obtains.

Mr. Charles Lindstrom (Chicago & Alton).—I wish to call attention to the point in Mr. Sanderson's paper in which he refers to the fact that the couplers can place themselves in a certain angle. Now it is evident that that angle cannot be reduced without breaking the knuckles, consequently the only remedy that can be provided, is to produce a coupler construction which will permit the excessive side motion without reducing the angle within which the couplers adjust themselves. Therefore, while it is proper to increase the side play, especially on tenders, the method proposed is not in the right direction. There are several couplers on the market to-day which have the correct feature; the head is loose, and the shank can move.

In an investigation which I made a few years ago, it was found that if a 70-ft. car was to be coupled to a tender on a 19-deg. curve, the two couplers could not approach each other closer than within about 6 in., and then only after allowances had been made for slack in journals, trucks, track, etc. If a car of this kind is coupled to a locomotive tender, and taken around such a curve, the platform will have to give way, or the trucks will be forced off the rail. This difficulty cannot be remedied by increasing the side play of the coupler head on the tender, as such side play simply results in a reduction of the angle between the couplers, which cannot take place without breaking couplers. A proper construction of a coupler for a tender should therefore be, either a parallel motion which would allow the coupler to be shifted over sideways without any change in the angle, or a coupler with a two-fold motion, such as results from the use of a flexible head.

Mr. R. P. C. Sanderson (written discussion).—Regarding the convex follower suggested in the paper, it was never intended that the convexity should continue all the way across the follower, but only between the draft gear cheek plates and directly under the yoke That portion of the follower bearing on the cheek plates would be parallel just the same as an ordinary follower.

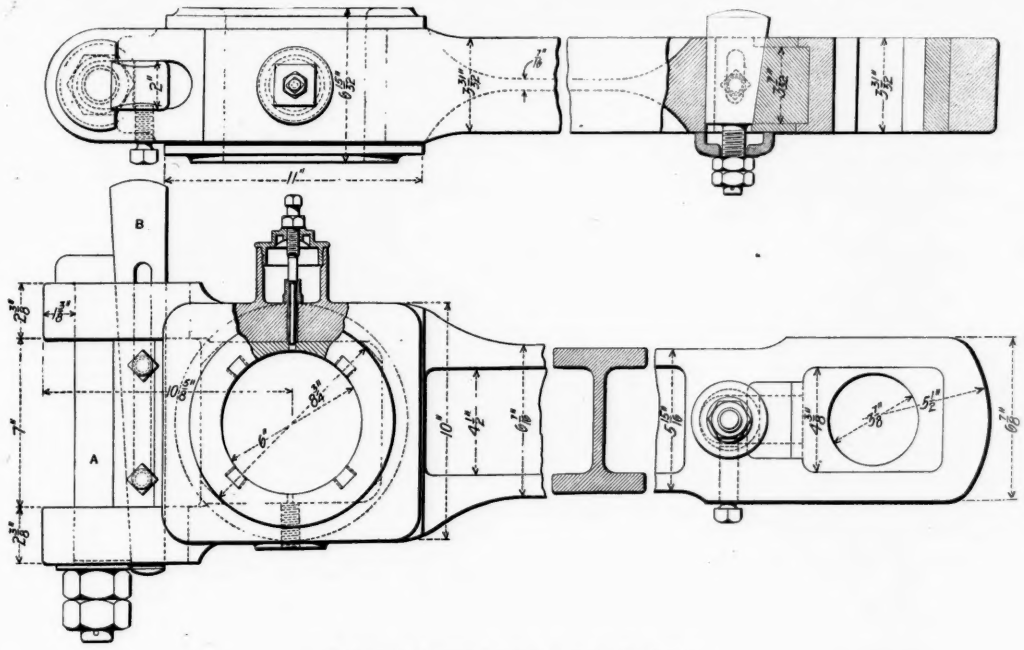
Regarding the argument made by Mr. Stark that the main trouble with the couplers is due to the rough handling of the cars, I do not feel that this argument can be considered of any valid importance to-day. Heavy engines have come to stay and heavier engines will shortly be in service. We cannot stop the march of progress by complaining that we are not prepared to meet the new conditions. If the draft gear on the cars is not strong enough for the service they now have to perform there is no use complaining, but we should get to work and remedy the difficulty. We cannot stop the rough handling; quick switching in the yards is imperatively necessary. The blow struck by a 50-ton car striking another one at four to six miles an hour is more than twice as destructive as that struck by a 20-ton car at the same speed. A good deal of the rough handling complained of is due to this fact, which should not be overlooked. Further, one of the advantages to be gained by the use of the automatic coupler is the quick switching movement without injury to the men, and the railroads have a right to expect a benefit from this. My own investigations have led me to believe that the damage to draft gear is more frequently caused by train shocks in service than by switching. To handle switching economically a switch engine should be able to take a train as brought in by a road engine and drill it complete. As the road engines grow in size the switch engines must do likewise and the service becomes that much harder for the cars.

It is complained in one part of the discussion that the couplers are already too strong because there is too much breakage in the car sills and framing. I look upon this as a reverse statement of the case and that it is up to the Master Car Builders of the country to make their car sills and center frames sufficiently strong so they will be comparatively free from damage, and very much in excess of the present strength of the couplers, draft gears and knuckles. It was not the intention of the writer to make any attack on the essential feature of the M. C. B. coupler, which is the head and contour lines of the head. The portion of the paper referring to these was simply leading up to the attack on the shank and method of attaching the shank to the car, which it is believed to be defective in design.

The writer's recommendation for a guide to the yoke at the back is intended to be coupled with the provision for lateral play at the carry irons, and the two must go together. What we are after is to hold the point at which the yoke pulls as near the center of the gear as possible.

Main Rod for Class E-2 Locomotive—Pennsylvania Railroad.

The old type of main rod and ends has practically gone out of use with the advent of the heavy locomotives of recent years. The form of stub end with a strap held to the rod by bolts and using a key for the adjustment of the brasses was found to be too weak for the work to be done. Various modifications and changes of type were made from time to time, until finally the open-jaw back end was introduced. As first applied the filling piece back of the brasses was held by two bolts, which were called upon to carry the whole pull of the rod. The result of this was that an incipient shear occurred putting an offset in the bolts at the junction between the fork and the block, making it exceedingly difficult to remove them without cutting them away. It was to avoid this trouble that the end shown in the accompanying



Main Rod of Pennsylvania Class E-2 Engine.

drawing was designed. If it the load is carried by the cotter and key which are made heavy enough to do their work without danger of starting to shear. Their combined depth is about 3⅞ in., and even should any shearing take place the pieces are easily removed.

An examination of the engraving will show the construction. The cotter (A) is put through the fork and prevents the spreading of the latter. The brasses are adjusted by the key (B) which has a bearing against the cotter for its whole length. The oil cup is forged on. At the crosshead end the adjustment is made by means of the horizontal key held by a nut that is so extensively used elsewhere.

The rod here shown is the one that is used on the heavy Class E-2 locomotives. It is interesting to note some of the dimensions of this exceedingly heavy rod. The fork has a sectional area of 1⅝ in. x 4¾ in., and the bearing is 6 in. in diam. and nearly 6½ in. long. dimensions that not so very many years ago would have been nearly or quite sufficient for the driving boxes.

British Locomotive Builders and Export Trade.

Not long ago Lord George Hamilton, Secretary of State for India, wrote to a member of parliament a letter on the subject of the inability of British engineering firms to supply the locomotives required in India. Lord George goes on to refer to the practice of the great English railway companies, who, he says, procure the great bulk of the locomotives they require from factories they themselves erect and control.

"Each railway company has its own type of locomotive, and each company constructs the great majority of the engines they so design. The outside firms get comparatively few orders from the home railways and there is no standardization of pattern or type in the limited orders they do receive. This two-fold uncertainty—first as to the orders they may get from the home railways, and, secondly, as to the type of locomotive they may be asked to build—has had a cramping effect upon the expansion of those enginering firms who construct locomotives. The demand for locomotives from India has greatly increased, and will continue to increase. South Africa has also come into the home market recently with very large orders, and these orders, in the aggregate, are considerably in excess of what the home factories can produce. The Indian Government have had to postpone placing certain orders until the South African orders can be advanced. The rolling stock in India upon several of the great arterial lines is quite insufficient to carry the goods waiting to be moved, and these companies cannot indefinitely await the execution of their pressing wants. The Assam-Bengal Railway, therefore, invited tenders for 10 locomotives and the East Indian Railway for 40 locomotives.

"The tender from a Hanover firm was 25 per cent. less than any British firm, with delivery in about half the time. This difference in price and time can only be accounted for by the fact that the British firms were so full of work that they could only tender for more at prohibitive rates. Thus the country has lost these contracts, and a trade connection with a foreign firm has been established to its detriment.

"From communications which have passed between me and certain leading firms, I am given to understand that if in India a standardization of locomotives such as exists in the United States and Canada could be adopted, one element of uncertainty would be removed, and if at the same time a forecast in advance could be made of the number of locomotives required for next year or a longer period, some of the obstacles now preventing an expansion of locomotive factories would be removed. In consultation with Lord Curzon, I have directed a conference of Indian railway engineers to be held in December next at Calcutta, with the view of considering these objects, and the result of their deliberations will be published for the benefit of the trade. I hope, therefore, that if the Government move on their side for the purpose of retaining in this country railway orders from other parts of the Empire, the manufacturers will also on their side consider how they can add to the existing means of production, and that we shall thus in combination prevent for the future the placing of railway contracts abroad which ought to be retained here."

Naturally this letter has provoked comment by locomotive builders. It is pointed out that consulting engineers have been repeatedly warned in the annual trade reports, since 1888, of the congestion which was sure to result from the failure, year after year, of those in authority to order rolling stock for India when home manufacturers were working their shops on short time and with a reduced staff. It is also stated that these reports were forwarded regularly to Lord George Hamilton and other officials.

The determining factor in placing the engines abroad must have been almost exclusively one of price. With respect to price, it is a well-known fact that the Indian specifications are, in regard to the conditions, the most severe that anybody is ever called upon to work to, and every part of the material that is used in these engines is the most expensive of its class. The inspection and testing are also exceptionally severe, and while this, no doubt, secures engines of the highest quality, it adds greatly to the cost of manufacture.

"No doubt the German firms who have taken these engine orders will be subjected to the same conditions with respect to the tests and with respect to chemical analysis of materials to which we have to work; but, as they have never, so far as we know, had any experience of such methods of working previously, the probability is that they will not like the contract after they have completed and ascertained the cost.

"We are glad to know that the Indian Government have taken up the question of standardization, because that explains, to a very large extent, the facilities with which American manufacturers can turn out work at the low price at which they sell. Practically speaking, we never make the same thing twice."

Another builder says: "The output of our existing locomotive establishments could be at once doubled without injuriously affecting the quality of the work produced, if the system of inspection were revised and brought more into harmony with that in America. A special expert commissioner has just visited the principal locomotives shops in America, and, although he reports that he has been most favorably impressed with the superior intelligence, industry and sobriety of the American workmen, he also states that there are no locomotive manufacturing establishments in the States that can be classed or compared with the leading locomotive workshops in this country as regards equipment."

Another reply to Lord G. Hamilton's letter, stated to have been issued by one of the largest locomotive firms in Scotland, is published by the *Times*. This authority avers that the present policy of our railway companies in manufacturing their own rolling stock is not only the most expensive system for themselves, but has done the greatest possible injury to the important industries affected thereby. How is it possible to obtain standardization of the rolling stock on our railways when locomotive superintendents are appreciated and rewarded according to the amount of individuality or, as it too often is, the eccentricity, displayed in the matter of design? Experience has shown that the locomotive manufacturer is the only safe medium of matured locomotive design and of economical manufacture, and it is just because this natural order is observed in the States that the locomotive trade in America has increased by leaps and bounds to the ultimate benefit in every direction of the railways in that country.

This statement continues, the greatest difficulty locomotive builders in this country have to contend with at the present is, not so much the want of standardization as the exacting and unreasonable nature of the inspection. As the rolling stock on every line in India has been restricted in weight, etc., by the most stringent limitations, there is at the present time not a single locomotive in all that vast country which could satisfy modern ideas as regards dimensions and weight. In this respect the Cape Government railways have left India far behind, and their rolling stock manufactured in this country is quite up to modern practice, even in America. The proposed conference will, therefore, be much better employed in abrogating the obsolete Government weight limits now in force, or alternatively in standardizing up the permanent way in India to modern requirements.

It is no occasion for panic or alarm that German builders, who are now passing through a most serious financial crisis—largely due to overproduction—with the added aid of protection in their own country, are able to underquote home manufacturers. No enlargement of productive capacity or possible conditions would enable locomotive builders in this country to compete successfully under such arrangements, and no manufacturer who desired to live would attempt to do so.

An independent view of the situation is that taken by a correspondent of the *Standard*, who says: "Those of your readers who, like myself, have been engaged in the design and construction of locomotives for roads in the United States and Canada will wonder what the British builders mean by a 'standardization' of American locomotives. The leading roads of the United States and Canada require their engines built to their own designs and specifications, as is the practice with the railways in Great Britain. If a reference be made to American locomotives built for similar service on the various roads, great differences will be found in design, in proportions and in details. There is nothing like the adoption of a standard design for any one type of engine. During the last seven or eight years there has been a remarkable increase in the weight and power of American locomotives, and the constant changes in design thereby rendered necessary has also militated against the possibility of 'standardization.'

"Mr. Bryan, president of the Richmond (Va.) Locomotive Works, addressing the meeting of the American Master Mechanics' Association in 1899, referred to the statement made in an English paper that the railway engineers in the United States were content to leave the design of locomotives to the locomotive builders, who were, consequently, free to arrange standard types, to stock standard parts and specialize machine tools for the standard parts. Mr. Bryan then said: 'Think of that, will you! Think of that, O you master mechanics, who cudgel your brains to find new designs, and who for ten years have been changing your types of engines so rapidly as to make the poor manufacturer's head swim. Fancy locomotive shops with all sorts of parts constructed and put upon the shelves ready to be taken down and put together at a moment's notice to meet the simple and uniform requirements of the superintendents of motive power.'"

The Good Roads Train of the Southern.

The Southern Railway good roads special train, which left Washington Tuesday, Oct. 29, will visit ten of the leading cities in Virginia, North Carolina, Tennessee, Alabama and South Carolina. The train will carry 10 cars of machinery for road building, a commissary car and Pullman for the 17 engineers, machinists and experts. The Austin & Western Manufacturing Co., of Chicago; the Western Wheeled Scraper Co., of Aurora, Ill.; the F. C. Austin Manufacturing Co., Harvey, Ill.; the Aultman Manufacturing Co., of Canton, Ohio; the Buffalo Pitts Co., Buffalo, N. Y., and the Good Roads Machinery Co., Kennett Square, Pa., contributed machinery and men to complete the train. There are a number of road graders, horse rollers, 10-ton steam roller, and two elevating graders. There are two traction engines and three crushing plants with a combined capacity of 150 cu. yds. a day. There are also distributing cars to surface the earth road with stone, gravel, chert, slag, tar, macadam or oyster shells, such as the various communities furnish. There are bins and screens for separating the various sizes of materials. The train carries

wheeled scrapers, flat scrapers, disc harrows, plows, shovels, picks; in fact, everything needed to build earth, macadam or gravel roads. The first stop was at Winston-Salem, N. C.; others will be Asheville, N. C., Nov. 6 and 7; Greenville, Tenn., Nov. 11 and 12; Chattanooga, Tenn., Nov. 15 and 16; Birmingham, Ala., one week, Mobile, Ala., Nov. 25 to 30; Montgomery, Ala., Dec. 2 to 7; then Atlanta, Ga., Greenville and Columbia, S. C., Danville, Va., Raleigh, N. C., and Richmond, Va. The train will travel nearly 6,000 miles.

Caulking Flues in Running Repairs.

The illustrations show the Columbian Central Flue Caulker, made by the Columbian Manufacturing Co., Columbus, Ohio; also sketches showing tools that have been used, when some difficulties here related were met. The Columbian caulker is made for every size of flue and each size has a variation of $^3/_{16}$ in.

Some railroads have a standard bead, and all their caulking tools are filed to a template; while some try for

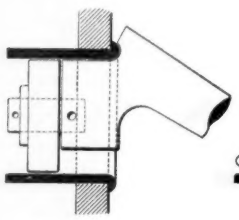


Fig. 1.

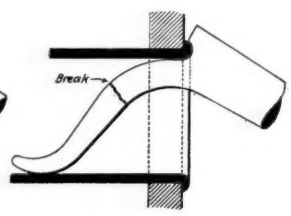


Fig. 2.

a standard, but pay no attention to having all tools filed alike. In the latter case the boilermaker at one terminal may have his caulking tool filed for a ⅜-in. bead, while at the other terminal the boilermaker may have his tool filed for a $^5/_{16}$-in. bead, and there have been cases where there was a difference of ⅛ in. In such cases the bead was flattened down by the ⅜-in. tool and cut away by a ¼-in. tool, and while this was going on the flue sheet was being cut away. Finally when the bead was entirely gone and the flues removed, it was discovered that it was necessary to renew the flue sheet. This does not occur in a short time on a road which devotes considerable attention to having tools filed standard at one place for the entire system, but it comes in time. The reason for this is that the boilermaker cannot, or does not, hold the single tool at the same angle all around the hole. Where it is convenient for him to hold the tool properly, the flue is caulked standard, but where it is inconvenient the flue is not caulked standard, nor is it caulked as well.

In watching the boilermaker using the single tool, one will observe that nine out of ten will hold the single caulking tool practically straight, in which position the bead is only driven to the outside of the flue sheet. The

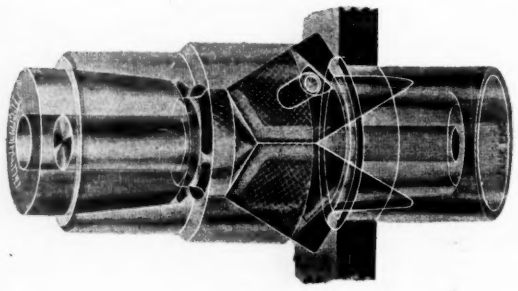


Fig. 3.

"bootleg" of the tool does not come in contact with the flue on the inside and set it out against the flue sheet as it is intended to, and there have been cases where the flue was driven away from the sheet, resulting in an engine failure and considerable delay to the transportation department.

On some roads there has been quite an effort made to have a standard bead, and all tools used filed at one place on the system; and tools have been designed to require the boilermaker to hold the tool at the proper angle. Figs. 1 and 2 show types of these tools. Fig. 1 was found to be impracticable, as the boilermaker could not handle it with any degree of satisfaction. Using the words of one of them, he was "not a contortionist, and it would require one to use that tool all day."

Then the tool shown in Fig. 2 was tried, which allowed the operator a little variation from the angle. This worked for a while on account of all the single tools being collected and there being nothing left to use; but in the course of a month several of these were broken off near the line shown, and the broken tools showed all the wear, whereas the ones that were not broken had not been used at all. This indicated that it was impossible to caulk a flue with the "bootleg" tool, as it should be done and not destroy the flue sheet.

To accomplish the desired result the Columbian Central Flue Caulker, Fig. 3, was designed, and after 12 months of service it has proven satisfactory. It cannot be held in any but a central position. It also caulks the flue uniformly and firmly, setting it out against the flue sheet hole, serving the double purpose of an expander and caulker. It is impossible for it to cut the sheet and it will work in the side and top flues as well as those in the center of the sheet. The tool is easily manipulated and commends itself to those who are interested in improving their method of caulking flues.

New Steel Plants, Rolling Mills, Etc.

Some notes are given below about improvements and extensions to the plants of iron and steel works, rolling mills, foundries, etc.; also the contemplated work of some of the newer companies. As improvements are almost constantly being made, it is impossible to mention all the work. There is also a general toning-up of numerous properties, of which there is nothing of such specific nature as to warrant mention.

ALIQUIPPA, PA.—Kidd Brothers & Burgher Steel Co., Pittsburgh, Pa., organized in August, are building a plant at Aliquippa, 15 miles from Pittsburgh, to make crucible steel. They will also have a wire plant.

APPLETON, WIS.—The Fox River Wire Works will build a wire plant here. L. H. Elsner is said to be interested.

BEAUMONT, TEX.—The Jupiter Steel & Coal Co., Boston, Mass., will build a plant in Beaumont to make castings from scrap. Work will be begun in December. W. J. Wilson, Engineer, Hamilton Bldg., Pittsburgh, Pa.

BENWOOD, W. VA.—Riverside furnace is being built by the National Tube Co.

BESSEMER, PA.—Furnace D of the Edgar Thomson works of the Carnegie Steel Co. will be rebuilt on a larger scale to make the capacity 400 tons a day.

BIRDSBORO, PA.—The E. & G. Brooke Iron Co. will build a steel casting plant, to be operated in connection with the plant of the Diamond Drill & Machine Co.

BIRMINGHAM, ALA.—The Alabama Consolidated Coal & Iron Co. is making some extensive improvements at the several plants. Principally at the Ironation Furnaces, where one furnace is being relined and another enlarged. At the Gadsden and Attalla Ore Mines new tipples fully equipped with new ore crushing and hoisting machinery is being put in. Additional boilers are being put in and some houses are being built at Gadsden furnaces.

The Republic Iron & Steel Co. has not yet decided to build a large steel plant in Alabama, but are considering such a plant as a part of a plan to develop their Pioneer property.

BRIDEGPORT, CONN.—The Bridgeport Malleable Iron Co. will replace some of the old buildings with new ones in connection with their gray iron department.

BUFFALO, N. Y.—The Lackawanna Iron & Steel Co. is building an entire new plant in South Buffalo, and will dismantle the plant in Scranton, Pa.

The United States Tube Co. is building a plant to make steel tubes, to have an output of about 125 tons per day, which may be increased to 400 or 500 tons per day.

The Buffalo Forge Co. will build an entire new plant at a more favorable location, having outgrown the present plant.

BURNHAM, PA.—The Standard Steel Works, of Philadelphia, will build a new open hearth steel furnace at their plant at Burnham, Pa., with a capacity of 135 tons per day.

CANTON, OHIO.—Carnahan Tin Plate & Sheet Co., recently organized, is building a plant to consist of six sheet mills and six tin plate mills; also a stamping works.

Stark Rolling Mill Co. is building a six mill sheet plant; also bar mills and two 20-ton open hearth furnaces.

CARNEGIE, PA.—The Carnegie Sheet Steel Co. will build a four-mill plant near Carnegie.

The Jupiter Steel & Coal Co. is about finishing a plant near Carnegie, to make castings from scrap. W. J. Wilson, Pittsburgh, Pa., Engineer.

The West Carnegie Sheet Steel Co. is about to be incorporated by George W. Wilson, former Director of the Department of Public Works, of Pittsburgh, Pa.; City Treasurer D. R. Torrence, Attorney W. H. Skivington, Joseph R. Paull and Attorney G. N. Chalfant. The plans will cost about $250,000.

CARTHAGE, OHIO.—The Block-Pollak Iron Co. is building quite an addition to the present plant. The machine shop is a fireproof building of steel and brick construction, 140 ft. by 95 ft. It will be equipped with all the latest designed heavy machine tools, such as lathes, slotters, boring mills, etc. It will also be equipped with a 40-ton electric traveling crane. This shop will be run entirely by electricity, and there is now being installed generators, motors and also two 150 h.p. boilers as well as a 400 h.p. new Corliss engine. When the shop is finished the company will be equipped for turning out heavy shafting and forgings of both iron and steel very quickly, and will be able to handle very large-sized shafts.

CATASAUQUA, PA.—The Empire Steel & Iron Co. is rebuilding one of the furnaces here, increasing its output 75 per cent. Extensive improvements are also being made at the ore operations at Mount Hope and Oxford, N. J., which will increase the output 200 per cent.

CHESTER, PA.—The Chester Iron & Steel Co. has been organized by P. Haliday, H. Whittemore and others, of Pittsburgh, and will take over the old plant of the Combination Steel & Iron Co.

The South Chester Pipe & Tube Co., of Chester, Pa., will build a large rolling mill in connection with their pipe and tube plant. It will be of large dimensions, of brick and iron and adjoin the plant of the Tidewater Steel Co.

The Tidewater Steel Co., it is said, will increase its capital and build a large mill to make rolled steel. The open-hearth department will be extended and a slab mill built.

CHICAGO, ILL.—The Iroquois Iron Co., expects in a few days to put into blast new furnace B, which has been building for 18 months and which is to be operated in addition to furnace A. This additional furnace will probably increase the daily capacity of pig iron to about 500 gross tons. The Iroquois plant is located on the Calumet River, near its mouth, with a dock frontage of approximately 1,000 ft. and a depth of water that will enable the largest ore carrying vessels to come to its dock. It is also equipped with eight Brown Hoisting Machinery Co.'s bridge unloaders. The plant is strictly modern. The officers are M. Cochrane Armour, President; Wm. A. Rogers, Vice-President, and Geo. A. Tripp, Treasurer.

The Illinois Steel Co. will enlarge its plant in South Chicago to double its capacity. About $1,000,000 will be spent.

CLARKSBURG, W. VA.—Jackson Iron & Tin Plate Co. is building a 14-mill sheet and tin plate plant in this city. Moore Jackson, President.

CLEVELAND, OHIO.—Plans are being made by the Acme Foundry Co. for a new plant. The present works will be abandoned.

COATESVILLE, PA.—The Lukens Iron & Steel Co. is building a steel plate mill, with rolls 140 ins. long in the body by 38 in. diameter. There will be large continuous furnaces built in the mill; also pit furnaces. This mill will have an annual capacity of over 100,000 tons of plates. With the completion of the mills now building, the company will have the largest capacity of any works except the Carnegie works.

COLUMBUS, OHIO.—The plant of the Columbus Malleable Iron Co., recently destroyed by fire, will be rebuilt soon.

CONNELLSVILLE, PA.—The Rolling Mill Co. of America is reported organized to build a 20-mill plant to make sheet steel and steel billets. The plant will cost $500,000, and will be located in South Connellsville. W. J. Logan, President.

CONSHOHOCKEN, PA.—The Alan Wood Co., makers of sheet and plate iron and steel, will build a new open hearth steel plant here.

COVINGTON, KY.—The Licking Rolling Mill Co. will build a corrugating plant.

CUMBERLAND, MD.—The Schönthal Iron & Steel Co., lessee of the Cumberland Rolling Mills, will double the capacity of the plant. It is said that two new heating furnaces, twice the size of the old one, will be built and the old one repaired.

CUYAHOGA FALLS, OHIO.—Cuyahoga Iron & Steel Co. is building a rod mill with a minimum capacity of 60 tons per day. The property has been sold to the Hartman Mfg. Co., of New Castle, Pa.

DONORA, PA.—The Union Steel Co. is preparing to build furnaces here.

EDDYSTONE, PA.—The Tindal-Morris Co., operating the Frankford Steel & Forging Works and the Eddystone Engineering Works, is putting in a new steam hammer and additional furnaces and new machine tools at the plant in Ellwood City, which will increase the capacity 33 per cent. At the Eastern plant, in Eddystone, the company is putting in two new hammers with furnaces and is adding considerable large machine tools. The improvements to both plants will about treble the capacity.

ENSLEY, ALA.—The Tennessee Coal, Iron & Railroad Co. is building a new continuous billet mill and a rail mill at Ensley. A plate mill will be built at a cost of about $500,000.

GREENSBURG, PA.—The Westmoreland Steel Co., which will operate in south Greensburg, will take over the property and business of the Westmoreland Iron & Steel Co., located at south Greensburg. A larger plant will be built and the initial investment of the company will run to about $300,000. Iron and steel bars will be the chief product of the new company.

GREENVILLE, PA.—The Shelby Steel Tube Co., of Cleveland, Ohio, will increase the size of the Greenville plant. A billet mill will be installed.

HARRISBURG, PA.—The Central Iron & Steel Co. will build six 50-ton open-hearth furnaces.

INDIANA HARBOR, IND.—The Inland Steel Co., Chicago, Ill., is building a basic open-hearth steel plant. The open-hearth plant will contain blooming mill and four 50-ton furnaces with a daily output of 400 tons of basic open-hearth steel. The product of the plant will be billets, slabs and merchant bars. Later on blast furnaces will be built.

JAMESTOWN, PA.—The Cambria Steel Co. will build a large universal plate mill here.

JENIFER, ALA.—Jenifer furnace is being built by the Jenifer Furnace Co. A new coke stack will take the place of the old charcoal furnace.

KNOXVILLE, TENN.—The Knoxville Iron Co. is building a new plant in Knoxville into which the Knoxville and Harriman mills will be consolidated. They will also build a steel plant.

KOKOMO, IND.—The Kokomo Steel & Wire Co. is building a large additional plant to make steel rods, wire, nails and wire products.

LA FOLLETTE, TENN.—Searles Furnace is being built by the La Follette Coal, Iron & Ry. Co.

LEBANON, PA.—The American Iron & Steel Mfg. Co. contemplate extensive improvements to the plant at Lebanon.

MARQUETTE, MICH.—The Cleveland Cliffs Co., of Cleveland, Ohio, operating the Pioneer furnace, is building a large charcoal furnace here, with a daily capacity of 150 tons.

MILWAUKEE, WIS.—The Northwestern Malleable Iron Co. will build a foundry. Two furnaces will be bought, giving the company a capacity of 100 tons of malleable castings daily.

MONESSEN, PA.—Pittsburgh Steel Co., Pittsburgh, Pa., is building, at Monessen, a basic open hearth steel plant, rod wire and wire nail mill. This concern will take over the Pittsburgh Steel Hoop Co., and will make cotton ties. Some blast furnaces will also be built.

The Monessen works of the American Tin Plate Co. will be doubled in capacity at a cost of $500,000. C. W. Bray, Chief Engineer.

MUNCIE, IND.—The American Sheet Steel Co. will double the capacity of the Midland Works in Muncie.

NEW CASTLE, PA.—The Hartman Mfg. Co. is building an open-hearth steel furnace, rod and wire mills and a plant to make nails. The open-hearth plant will consist of five 50-ton furnaces. Arrangements will soon be made for building a modern 600-ton blast furnace to supply iron for the open-hearth department. The rod mill will have a daily output of

1,000 tons, and 12,000 kegs of nails per day will be made. The small wire plant in Ellwood City, owned by the company, has been removed to New Castle.

The New Castle Iron & Steel Co., recently organized, will build a plant to make steel bars, light rails and shapes. The office is 518 Park Bldg., Pittsburgh, Pa.

The Standard Iron & Steel Co., organized by Pittsburgh and New Castle capitalists, according to report, will build a mill for rolling refined iron bars and iron sheets.

NEWCOMERSTOWN, OHIO.—Tuscora Steel Co., recently organized, is building a plant for making black and galvanized sheets. The plant when completed will contain four sheet mills, four sheet and pair furnaces, two pairs of annealing furnaces and two gas producers. A galvanizing plant will also be built.

NICETOWN, PA.—The Midvale Steel Co. is making some additions to the present plant.

NORTH IRWIN, PA.—Elinor Iron & Steel Co. is building a rolling mill at North Irwin, which is expected to be in operation by Christmas. Plant will have 36 puddling furnaces, one train, three high rolls, one 16-in. three high finishing train, and one 12-in. three high finishing train. The product will be iron and steel merchant bars and skelp.

PARKERSBURG, W. VA.—Parkersburg Iron & Steel Co., Pittsburgh, Pa., is building a six-mill plant at Parkersburg and will install a bar mill and roll their own sheet bars. Product will consist of the finer grades of sheet iron for stamping purposes and specialties. Capacity will be from 12,000 to 15,000 tons per year.

PATERSON, N. J.—The Passaic Rolling Mill Co. will spend about $500,000 in increasing the capacity of the plant.

PITTSBURGH, PA.—The Carnegie armor plate plant of the U. S. Steel Corporation at Homestead will be enlarged to make larger deliveries to the Government. The enlargement will cost about $3,000,000.

The Jamison Coal & Coke Co., Empire Building, Pittsburgh, will build a modern plant in Salem and Hempfield townships.

Jones & Laughlins, Ltd., are building a basic open-hearth steel works in the Southside. It will have a capacity of 400 tons every 24 hours.

Pittsburgh Wire & Steel Co. has 88 acres of land opposite Monongahela, fronting on the Monongahela River, about 35 miles from Pittsburgh upon which they will build new rod, wire and wire nail mills, with capacity of from 400 to 500 tons per day.

Spang, Chalfant & Co., operating Etna Iron & Tube Works, is building another pipe mill to make pipe up to 30 in. in diameter.

PORT ORAM, N. J.—Joseph Wharton is about finishing a 600-ton blast furnace at Port Oram.

POTTSVILLE, PA.—The Eastern Steel Corporation has been formed, with a capital of $2,500,000, to take over and reorganize the Pottsville Iron & Steel Co. James G. Lindsay & Co., Philadelphia, are at the head of the new company. Considerable improvements and extensions are to be made and are provided for by a bond issue of $1,250,000.

PUEBLO, COLO.—The Colorado Fuel & Iron Co. is building furnaces D and E, and may add two additional stacks. The last of the two new furnaces will be in operation about July 1, 1902.

RACINE, WIS.—The Racine Steel & Iron Co. will build extensions to the foundry, also to the machine shop.

The Racine Malleable & Wrought Iron Co. will build a foundry at Lakeside. B. Hinrichs is Secretary.

READING, PA.—The Exeter Iron Co. is organized by Frederick Greiner, 406 Drexel Building, Philadelphia, who has bought the Diamond steel plant at Reading. The new company will make skelp, socket and bar iron.

RICHMOND, VA.—The Old Dominion Iron & Nail Works will immediately enlarge and improve their works. Gifford V. Lewis, President.

ST. CLAIR, PA.—The Crucible Steel Co. of America, Pittsburgh, has organized the St. Clair Furnace Co. and the St. Clair Steel Co., and is now building three blast furnaces, twelve 50-ton open-hearth furnaces, and blooming mill.

SHARON, PA.—Sharon Sheet Steel Co., an identified interest of the Sharon Steel Co., is building a ten-mill plant to make black and galvanized sheets.

Sharon Steel Co. is building 10 sheet mills, four additional open-hearth furnaces and a tube mill, to have a capacity of 400 tons of basic steel tubing per day.

SOUTH BETHLEHEM, PA.—The Bethlehem Steel Co. will enlarge its armor plate plant to make larger deliveries to the Government. The tonnage will be about doubled.

SOUTH MONACA, PA.—The Colonial Steel Co., of Pittsburgh, began building in July, and the following steel frame buildings are being erected by Wm. B. Scaife & Sons: Boiler house, puddle mill building, crucible melting building, forge and hammer shop, main rolling mill building and a warehouse. The puddle mill building will contain 18 single puddle furnaces, to be equipped with waste heat boilers. The melting building will contain eight crucible melting furnaces. The rolling mill building is 170 ft. x 640 ft. and 80 ft. high. The equipment will consist of the latest and most approved machinery in every respect, and particular attention is being devoted to the uses of electricity in the running of the smaller machinery. In addition, a number of open-hearth furnaces will be built, but the plans for these have not yet been made. The crucible plant will be started first. The products will be tool steel and all forms of crucible steel in bars and sheets, including circular saw plates, etc.; also high-grade open-hearth steel, etc.

STEUBENVILLE, OHIO.—La Belle Iron Works will build a tube mill to make all sizes of steel tubes from ¼-in. to 8 in. in diameter. They have just finished a skelp mill.

The Pope Tin Plate Co. has contracted for the steel buildings for its new tin plate plant with the Riter-Conley Mfg. Co. The contract for cranes has been let to Manning, Maxwell & Moore.

TARENTUM, PA.—Allegheny Steel & Iron Co., Pittsburgh, Pa., will shortly have the new sheet mills which they are building at Tarentum, near Pittsburgh, completed. Product will be fine steel sheets. Plant consists of a 50-ton basic open-hearth furnace, a bar mill of special design, six sheet mills and three cold mills. The capacity will be from 60 to 70 tons of steel sheets per day.

TERRE HAUTE, IND.—Highland Iron & Steel Co. is building a plant to make a full line of bar iron, heavy hoops and shapes.

THOMAS, ALA.—Pioneer Furnace, being built by the Pioneer Furnace & Mfg. Co., controlled by the Republic Iron & Steel Co., is nearly finished.

TRENTON, N. J.—The Olephant Steel Co. is building a plant in Trenton. Sydney Olephant is interested.

TUSKALOOSA, ALA.—Work has been begun by the Central Iron & Coal Co., an allied interest of the Central Foundry Co., New York, on a large blast furnace and coke ovens. A foundry will later be built. The plant will supply raw material for the Central Foundry Co. Joseph Lodge is President.

WASHINGTON, PA.—William Jessops & Sons, Ltd., steel makers, of Sheffield, England, have recently begun building a steel plant in Washington, Pa.

WAUKESHA, WIS.—The Waukesha Sheet Steel Co. has bought the old Wisconsin Central shops with 12½ acres of land, the main building being 275 x 115. A mill containing six hot mills, one bar mill and three cold roll mills is about ready for operation. They will also have a warehouse 100 x 50 ft.; a galvanizing and tine house 90 x 130; a power plant 60 x 110; equipped with four Tudor boilers 300 h.p. each.

WELLSVILLE, OHIO.—The hammer department of the Wood plant of the American Sheet Steel Co., McKeesport, Pa., will be removed to the Wellsville plant, where four new sheet mills will shortly be installed, making the plant a 10-mill instead of six, as heretofore.

WEST HOMESTEAD, PA.—The Carnegie Steel Co. will build an angle mill in the West Homestead portion of the Homestead Steel Works plant.

WHEELING, W. VA.—Wheeling Steel & Iron Co. is building a large tube mill to make both iron and steel tubes. New skelp mills are also building.

The Everson Steel Co. has been incorporated in West Virginia, with a capital of $3,000,000, and will build a plant in the Ohio Valley below Wheeling, where a new town will be located.

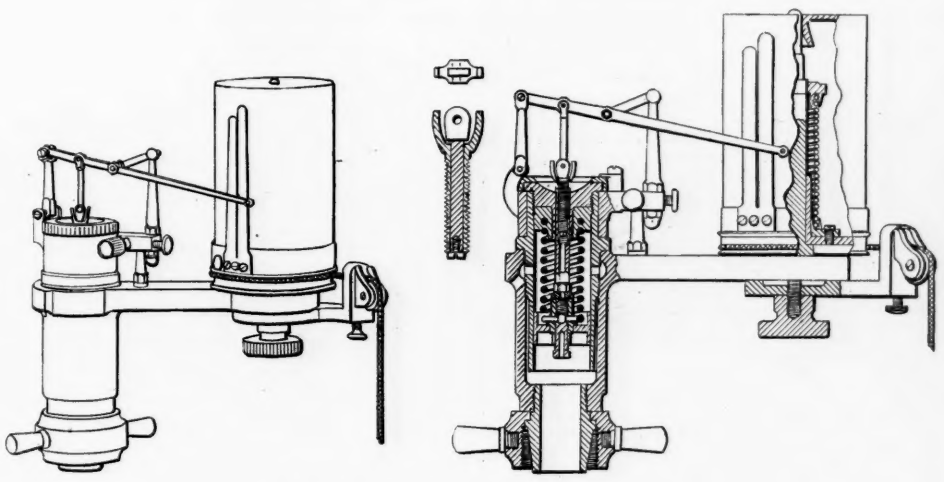
YOUNGSTOWN, OHIO.—A 26 and an 18-in. billet mill is being added to the Bessemer works of the Republic Iron & Steel Co., and will be ready by February or March. When finished they will about double the capacity of the works.

Youngstown Iron, Sheet & Tube Co. is building a plant near Youngstown, to consist of puddling, muck bar, skelp, tube and sheet mills. They will make iron sheets and iron tubes exclusively, and will do their own puddling. The sheet mills will be in operation in January.

The Star Improved Steam Engine Indicator.

This instrument, as here illustrated, shows the latest improvements that the Star Brass Mfg. Co., Boston, has made in steam engine indicators. In outward appearance it is somewhat like the Thompson indicator and the pencil movement is Thompson improved.

One improvement which the manufacturers emphasize is the attachment of the cylinder cap to the interior shell within which the piston moves, rather than to the outer shell, thus giving correct alignment. The interior shell is removable, as in instruments which do not possess this feature. This arrangement also provides a jacket space filled with working steam around the interior shell.



The Star Improved Steam Engine Indicator.

Another feature to which attention is invited is the hard rubber non-conducting covering on the edge of the cylinder cap. This covering can be handled with comfort. As every one who has operated an indicator knows, it is impossible to unscrew the ordinary cap without burning the thumb and finger. There is also a vent tube for carrying away the waste steam and hot water that blows past the piston. This tube is attached to the side of the cylinder and extends below the body of the instrument to clear it, and prevent hot water from dripping on the hand of the operator while turning off the indicator cock.

The piston rod has an adjustable swivel-head by which the position of the pencil arm can be varied and the atmospheric line drawn at any distance from the lower edge of the card, without removing the piston from the cylinder. It is only necessary to screw the swivel-head up or down the desired amount. A new detent motion is used. It has a friction clutch which is simple and effective, a ball being thrown into contact with a groove in the circumference of the drum-base.

The manufacturers are prepared to furnish a complete outfit for indicating, including indicators, reducing wheels, lazy tongs, pantagraphs, planimeters, carrying pulleys and blank cards, the latter either plain or made of prepared paper.

M. C. B. Draft Gear Tests.

The M. C. B. committee on draft gear tests has issued a circular to members of the Association and draft gear makers calling a general meeting at the Auditorium Hotel, Chicago, at 10 o'clock, Wednesday morning, Nov. 20. The purpose of the meeting is to discuss a proposed plan of tests and all interested in the subject are invited to be present.

It is said that the Pennsylvania R. R., through W. W. Atterbury, General Superintendent Motive Power, has given the Association the use of its drop-testing machine at Altoona, Pa., for drop test purposes. Likewise Purdue University, through Prof. W. F. M. Goss, has given the Association the use of its 300,000-lb. capacity tensile testing machine, at Lafayette, Ind., for tensile and compression tests. Those submitting gear for test will be required to pay for the work of assembling the parts and a sum (to be determined at the meeting) covering the cost of this work shall be deposited with the Secretary of the Association before the work is begun. The manner of assembling the gears for test purposes will also be decided at this meeting.

At present it is the opinion of the Committee that the work as outlined by this preliminary plan can best be carried out first, after which other questions will be taken up which involve different methods of testing. Further, it is held that the committee should reserve the right to decide, from the gears submitted, which ones shall be tested, and in making this decision, two classes of gears will be considered: First, existing designs now in use on cars; and second, new designs not yet in service, but thought to be worth trial. It is considered only fair that a clear distinction be made between these classes. The following is the plan of tests proposed and outlined in the circular:

Preliminary Plan for Draft Gear Tests.—The draft gear tests for strength will consist of: First, tests under a standard M. C. B. drop testing machine, and second, tests in a 300,000-lb. capacity tensile testing machine. The work involved in making these tests will be done first, and then questions involving different methods of testing will be studied. The draft gear problem can only be investigated by disposing of a few questions at a time, which is the reason for starting in this way.

General Plan.—A brief explanation may be in order to indicate the general plan and scope of the proposed tests, and to show why competitive road tests of draft gear for *strength* are not included.

These tests of the *strength* and *capacity* of draft gear must necessarily be competitive tests involving commercial interests, and for that reason, if for no other, it is essential that the conditions of the tests be alike for all, and further, that the conditions be accurately known. In road tests many factors are beyond control and measurements cannot be made with accuracy. If tests of the strength of two kinds of draft gear were made on the road, the results would be indefinite. As road tests of draft gear are so indefinite and require so much time and expense to conduct them properly, it is proposed to make use of road tests only where absolutely necessary, and then to eliminate the commercial interests so far as possible. For present purposes road tests seem superfluous.

The general plan is, therefore, to show the relative *strength* of different gears which may be submitted by drop tests and by pulling and compression tests in a tensile testing machine of large capacity. These tests will be expected to show the yielding resistance pro-

vided in draft gear and the relative standing of the different constructions under steady pulls and under shocks.

General Requirements Under Which Draft Gear Will Be Received for Test.—Draft gear makers are invited to submit sample riggings for competitive tests under the following general requirements:

That a dimensioned tracing be submitted by the manufacturer to Mr. W. F. Kiesel, Jr., Assistant Engineer of Motive Power, Pennsylvania R. R., Altoona, Pa., a member of the committee, which tracing should show the construction of the gear submitted for test. The tracing should also show plainly whether the gear is, or is not, like draft gear regularly furnished railroads, and, if not, wherein the difference in construction lies. The object of this requirement is to avoid impressions being created that tests of special designs are tests of designs regularly furnished railroads.

Those entering draft gear for competitive tests will be expected to formally approve or disapprove the methods and apparatus intended to be used before the work is commenced. It will also be understood that the true names of the different gears will be shown in the report, together with a full record of observations.

DROP TESTS.

Requirements.—Samples of draft gear now in use, or which are being applied by railroads, will be received for this test up to Dec. 15, 1901. The drop test machine used will be the one at Altoona, Pa., built according to M. C. B. Standards, and shown in the Proceedings of the Association.

Duplicate riggings (two) should be sent, charges prepaid, to A. W. Gibbs, Assistant Mechanical Engineer, Pennsylvania R. R., Altoona, Pa. The parts should be sent just as though they were to be furnished to a car builder and the gears will be mounted as shown by Fig. 1 of the accompanying drawing*. Those riggings approved by the committee and received up to Dec. 15, 1901, and which conform to the general requirements of the test will be accepted by the Committee. Each maker will be required to pay for the work of assembling his gears and a sum covering the cost of this work shall be deposited with the Secretary of the Association, before the test is begun.

Tests.—In the Altoona tests, the gear will be blocked in place with the ends of the draft timbers or metal sills resting on the base of the machine. A weight of 1,640 lbs. will be allowed to strike a dummy coupler or block which will be used in place of the coupler. Five blows will be given from each height of drop, the drop ranging by intervals of 5 ft., or by smaller intervals as may be found desirable. The test will be continued until some vital part of the gear is destroyed. In this test the breakage or distortion of yokes, followers, etc., will be noted as well as failures of the attachments, with a view to determining the strength of these parts relative to the attachments. A record will be kept of the blow required to exhaust the yielding resistance of the gear, and the amount of the recoil of the drop under the various conditions.

TENSILE AND COMPRESSION TESTS.

Requirements.—Samples like those for the drop test will be used. Duplicate riggings (two) should be sent, charges prepaid, to Mr. William Forsyth, Purdue University, Lafayette, Ind. These gears, including the dummy coupler, spring, etc., complete, shall be mounted as shown by Figs. 2 and 3 of the accompanying drawing*. Those riggings will be accepted which are received up to Dec. 15, 1901, and which conform to the general requirements of the test and which are approved for test by the committee. In this case the makers must supply all the parts and pay for assembling them.

Tests.—The Purdue experiments will consist of testing one gear of each kind in compression and the other in tension, noting distortion or failures. These tests will be carried to the capacity of the machine, 300,000 lbs., provided the gears do not previously fail. Curves will be obtained showing the relation between the load and the movement of the followers. This is a Riehle screw machine of 300,000 lbs. capacity, with automatic beam of such dimensions as to allow tensional and compressional tests to be made on specimens 8 ft. long and less.

In the Purdue tests, the gears may be attached to either steel I-beams or to 5 x 9-in. oak timbers, the spread varying from 9 to 23 in. for the steel beams, and from 9 to 18 in. for the wooden construction. The object in thus designing the fittings for the tensile testing machine is to allow the maker plenty of room so none will be prevented from participating in the tests due to limitations, not present on cars.

This preliminary plan will be the basis of discussion at the joint meeting, and a large attendance is desired. All are invited.

This circular is signed by E. D. Bronner, Chairman; T. A. Lawes, Mord Roberts, Geo. F. Wilson, J. F. Deems, C. M. Mendenhall, Wm. Forsyth, and W. F. Kiesel, Jr.

*Drawing not reproduced.

Railroad Material for South Africa.

Mention was made in these columns last week of some large orders for rails and locomotives which Sir C. B. Elliott, special commissioner for the Cape Government Railways, was reported to have placed in the United States. Naturally, this report aroused dissatisfaction amongst British manufacturers, which feeling was strongly expressed in a letter published in Tuesday's *Times*. The writer declares that when Sir C. B. Elliott arrived in this country from the Cape last June "he was at once approached by many of the most eminent firms in the kingdom and that in some cases he actually promised to visit their works to examine their capacity of production, etc. Moreover, they expressed themselves ready and willing to undertake any commissions which might be entrusted to them, and to meet Sir Charles Elliott, in the matter of time in delivery, for the due execution of which they were prepared to give the usual guarantees." The writer goes on to charge Sir Charles Elliott with "wilfully ignoring" the "great claims" of British manufacturers for consideration, and declares that by giving foreign competitors preference he has rendered an ill-service to his country.

The author of this indignant letter is doubtless well-intentioned, but if he had waited a few days to verify his facts, he would have saved himself and other people a deal of trouble. The fact is that the report of large American orders having been placed by Sir Charles Elliott is absolutely unfounded. Sir Charles has *not* placed an order with the Carnegie Steel Company for 10,000 tons of rails; *nor* one for 29 standard-gage locomotives with the American Locomotive Company; *nor* one with the H. K. Porter Company for several smaller locomotives. This categorical contradiction was received from Sir Charles Elliott's own lips in Westminster yesterday, so that there can be no doubt about the matter. He further said that he is acting in strict concert with the Cape Government authorities in all the contracts he is placing, and that the absolute instructions given by this Government two years ago regarding orders for rolling stock and other railway requirements were that a preference in price of 10 per cent. must be given to all goods manufactured in the British Empire.—*Transport.*

The Present Position of American Railroads.*

BY THOMAS F. WOODLOCK.

(*See the Railroad Gazette, Sept. 27, p. 671.*)

The influence of the "community of ownership" principle has been less evident in the case of the railroads lying in the "southern division" than elsewhere in the country. This division is mainly served by four great systems, all more or less independent of each other, and yet competing for business at a great many points. These systems are, naming from east to west:

1. The "Seaboard Air Line."
2. The Southern Railway and connections.
3. The Louisville & Nashville, and
4. The Illinois Central.

A comparison of their respective maps will show a great interlacing of trade practically all through the territory, south of the Ohio River and west of the Mississippi River. And yet there is little or no "community of interest" to be discovered. . . .

Space will not permit a detailed analysis of the position and finances of each of these roads. Suffice it, therefore, to say of the Southern Railway that it is perhaps the most progressive of the Southern railroads, and considering density of business and other vital factors in cost, it is operated in a more enlightened and economical manner than any of the others.

The Illinois Central, next in magnitude, lies mainly in the Ohio & Mississippi valleys, with a sort of cross line at right angles to the main system. This cross line is the Chicago-Omaha line, which differs entirely in the characteristics of its business from the main system. This lies almost directly north and south, between Chicago, St. Louis and New Orleans, with a branch to Louisville, and several smaller branches, which latter, however, hug the main system rather closely. The line is especially well located for economical operation, as it is very low grade indeed, with whatever grades there are favoring the heavy traffic. Reference to the map shows that the Illinois Central lines meet those of Southern at a great many points, among which are: St. Louis, Cairo, Memphis, Paducah, Greenville, Louisville, etc. Thus the Illinois Central and the Southern Railway practically enclose Louisville & Nashville (which lies between) from the Ohio River to the Gulf.

When it is remembered that there is no special alliance between any two of these three roads, it is clear that there are materials for a fight some day when conflict of interests becomes acute at any one point. Relations, in fact, between Louisville & Nashville and Illinois Central are probably not over cordial since the absorption by the latter of the Chesapeake, Ohio & Southwestern, giving it a line from Memphis to Louisville closely paralleling the Louisville & Nashville line. Up to the present, however, none of the three has apparently been disposed to begin a fight. . . . No other large system in the United States shows so small a relative growth in train-mile efficiency as is shown by Illinois Central, and few roads have had so many advantages of grade to start with, and so much money for modernizing plant. . . .

As already suggested in the foregoing, Louisville & Nashville, with its 3,100 or so miles, occupies a somewhat cramped position in the middle south, with Southern Railway pressing it hard on one side and Illinois Central hemming it in on the other. The main stronghold of the Louisville & Nashville is the Birmingham iron district in Alabama, and while the Southern Railway competes in that territory, the Louisville & Nashville is probably better situated for the traffic arising therein. On the whole, however, its business is very largely competitive and of rather low grade, giving a low ton-mile revenue. The company has been very conservatively financed of recent years, having paid for necessary improvements almost entirely from income since 1893. . . . Somehow the position of Louisville & Nashville does not seem over strong strategically so far as the future is concerned, as its rivals have been for more active than it has in taking up adjacent territory. At present, however, the company is prosperous enough, and if it could see its way to the maintenance of present gross earnings, could pay 6 or 7 per cent. on its stock, and still have money for improvements. It is fair to say for its operating department, moreover, that it has to handle its business over some heavy grades that cannot be economically eliminated.

All that can be said at present of the Seaboard Air Line is that it is largely a new road, with all the corresponding advantages and weaknesses. Judging, however, from the persistence and perseverance of its backers, who have so far carried it through the most dangerous phase of its existence, it will gradually make a place for itself. It competes actively with the Southern Railway at many points in the Atlantic cotton states, and is in a position to disturb rates over a large territory if it desires to do so. It is understood, however, that it now has amicable relations with the Southern Railway. At all events, there is no open quarrel between them, as there was some time ago.

The equilibrium in the "Southern Division," has, on the surface, a somewhat unstable appearance, owing to the scattered ownership of Louisville & Nashville, and the independent ownership of the Seaboard Air Line. Mr. J. P. Morgan undoubtedly controls the policy of the Southern Railway, and Messrs. Kuhn, Loeb & Co., with Mr. Harriman, probably partially control Illinois Central. Who, however, owns control of Louisville & Nashville? Mr. August Belmont, with the Rothschilds, undoubtedly exercises control at present, but it is doubtful if the ownership of the stock is at all concentrated.

I have not considered the Atlantic Coast Line in dealing with the "Southern Division." That, however, has over 1,700 miles of track, and is, from one point of view, one of the important roads doing business south of Washington.

Although lying west of the Mississippi, the Chicago & Alton-Kansas City Southern line really belongs more to the "Southern Division" than to the South-Western. The Chicago & Alton road is one of the principal Chicago-St. Louis-Kansas City lines, and with the Kansas City Southern as a close ally, forms a pretty direct Chicago-Gulf line. This system is closely controlled by the Kuhn-Loeb-Harriman interests, and is, therefore, accounted for in the "community of ownership" theory. Your readers will doubtless remember the meteoric career of the old Kansas City, Pittsburgh & Gulf Railroad under Mr. Stilwell's regime. In the reorganization there was brought about a drastic reduction in fixed charges, and the present Kansas City Southern is in all probability well able to carry its present burden of bonded debt.

I have now roughly outlined the conditions that exist in three of the four main territorial divisions indicated in the first of these series of articles. The remaining "South-Western Division" is chiefly remarkable for its independent roads, which I must treat separately. These are:

1. Atchison, Topeka & Santa Fe.
2. Missouri Pacific and connections.
3. St. Louis & San Francsico.
4. Chicago, Rock Island & Pacific.

Principal among the "independent" lines, and most important of the Southwestern roads, is the Atchison, Topeka & Santa Fe. . . . It now includes not far short of 8,000 miles. There are two things that distinguish the road from other large roads, viz., the fact that, alone of all the trans-continental lines, it extends from Chicago to San Francisco, and the fact that there is no one dominant stockholding interest or combination of interests in control of the property.

As I explained in foregoing articles, there is a dividing line at Chicago and St. Louis that has so far been crossed by no large system. Lines west of Chicago with trans-continental connections, such as Burlington, North-West, etc., have exchanged business with lines east of Chicago, if not exactly indiscriminately, at least without any hampering alliances. Of all the Western lines, however, Atchison only connects Chicago and the Pacific Coast over its own tracks. It is, therefore, practically the only single company that can, of itself and by itself disturb the trans-continental situation throughout its entire length. And it is the only large system in the West that nobody in particular owns or specially controls.

Ownership of the Atchison road became thoroughly scattered in the reorganization and afterwards. I am credibly informed that Messrs. Baring and the interests represented by Mr. Robert Fleming, together with the interest known as "Berwind Pool," are at present the only examples of concentrated ownership in the company, and that all three combined are a relatively small percentage of the whole. At all events, it is perfectly safe to say that there is not in the company any ownership susceptible of sufficient concentration to change the management through the board of directors. Up to the present time there is not a scintilla of truth in the various stories that Pennsylvania or any other large railroad has purchased an interest, controlling or otherwise, in the Atchison road. And yet, I venture to think that Atchison cannot safely be left out of consideration in any scheme designed to secure trans-continental harmony.

*Extracts from recent articles written for *The Economist*, London.

It can, whenever it desires, bring to naught plans devised for maintenance of trans-continental rates, and spread devastation over the entire western half of the United States, from a railroad point of view.

The company's great prosperity is a serious factor in the situation as other railroads see it. There has been a curious blindness on the part of the public towards Atchison's progress. Four years ago, before the company had begun to pay dividends on the preferred stock, the figures (for the year ended June 30, 1897) showed plainly enough that on the then existing gross earnings, the company could pay 2 per cent. on the common stock. . . . Last year (1900-01) the company had an earning capacity equal to not less than 9 or 10 per cent. on the common stock under ordinary maintenance. Yet, the fact that within 12 months the common stock has risen from 30 to 90, and the preferred from 70 to 108, has caused people to consider as a wild speculation what was merely a long-delayed reflection in market price of incontrovertible facts. Consequently, while many interests would be glad to buy control of Atchison at last year's figures, all are afraid to do so at what now seems a high price. The fact is that an opportunity has been lost, and the company has been allowed to develop itself as an independent property, with an immense potential capacity for making trouble over a very large area. Sooner or later the control of Atchison will have to be brought in some way into the hands of the great trans-continental "community of interest" if the work of that "community" is to be completed. . . . The present management of the company is pushing its development in all directions, and earnings can fall off a good many millions of dollars before present dividends need be suspended. Altogether, Atchison is probably the most interesting of the "railroad problems" yet unsolved from the "community of interest" point of view.

Still another problem of a somewhat puzzling character is the "Gould system" of roads, with Missouri Pacific as its foundation. Mr. George Gould gives indication of an ambition in connection with his properties that seems to threaten some trouble before long.

The "Gould System" of railroads includes the following properties and mileage:

	Miles.
Missouri Pacific	5,350
Texas & Pacific	1,620
Denver & Rio Grande	1,675
Rio Grande Western	645
Wabash	2,000
Wheeling & Lake Erie	470
Total	11,760

besides a large (probably dominant) interest in Missouri, Kansas & Texas (2,200 miles), and some interest in St. Louis South-Western.

Now this system extends in an unbroken line from Buffalo (to Detroit over the Grand Trunk) to Denver, Grand Junction (Colorado) and Ogden on the north, New Orleans and Galveston on the south, and El Paso on the southwest, passing through Chicago, St. Louis and Kansas City. It thus forms a complete system connecting Trunk Line territory with the Pacific Coast via Union and Southern Pacific. Moreover, the Wheeling & Lake Erie has contracted for an extension into Pittsburgh, thus directly invading Pennsylvania's territory. It is this particular scheme which gives to the Gould plans their somewhat alarming character, rather than the fact that the system practically crosses the dividing line between East and West.

Mr. Gould has recently re-acquired control of the Wabash road, and through it the Wheeling & Lake Erie. Previous to the formation of the Steel Company, contracts had been made between the Wabash-Wheeling interests and Mr. Carnegie for a portion of the latter's tonnage on the completion of the Pittsburgh extension. These contracts had to be assumed by the Steel Corporation and stand intact to-day. Other plans have been made to secure other Pittsburgh business, the object being to feed the Missouri Pacific and its southern and western connections with business. . . .

"The "Gould System" is, I believe, pretty thoroughly shut in at Buffalo, and can only obtain a New York entrance by building. It can reach the Pacific coast to advantage only over the lines of Union or Southern Pacific, though, indeed, it does connect with Atchison at Pueblo. Thus, it is not a complete trans-continental line. Nevertheless, it has many possibilities as a disturber of the peace. Inasmuch, however, as Mr. Gould is heavily interested in Union Pacific, and is a director of that company, it is reasonable to assume that his interest in the trans-continental situation will be more or less in harmony with those of the great trans-continental "community of ownership." In this event, the Wabash is the storm center of the system, and the trouble will be more or less confined to Trunk line territory. A natural solution of the problem would be a sale of the Wabash lines east of Chicago to the Vanderbilt-Pennsylvania interest, thus eliminating the Pittsburgh difficulty and also leaving the east-and-west dividing line intact. . . .

The Chicago Great Western line is distinctively an English owned railroad, and it has been a long and sharp thorn in the sides of Northwestern lines. It connects Chicago, St. Paul, and Kansas City by direct low-grade lines, and is arranging to enter Omaha and Sioux City. So far, thanks to a continuous supply of new capital from the English stockholders, the line has steadily pursued its development as an independent road, and is now in a position to do business economically, and on at least even terms with its competitors. Figuratively speaking, Mr. Stickney sits in a convenient position, facing the broad ends of three wedges, each pointing in a different direction, and in his hand there is a heavy sledge. At any moment he can split open the rate situation between Chicago and St. Paul, St. Paul and the Southwest, and Chicago and the Southwest. People say Mr. Stickney likes nothing so much as wielding the sledge to the above purpose. However that may be, the record of his road is one of almost continuous rate troubles, and still it remains absolutely independent, and rather more powerful for harm than it ever was. If permanent peace is desired in the Northwest Mr. Stickney's road must be brought "into camp" somehow or other—there never will be lasting peace till this is done. Meanwhile, its competitors cannot hope for its bankruptcy, as it has no mortgage debt, and is earning a good deal more than enough to take care of its debenture interest. Its stocks sell at reasonably good prices—at least, they are not on the bargain counter.

The St. Louis & San Francisco road—once part of the Atchison system—need not be considered as bearing very much on the general situation in the Southwest. It is developing what may prove an important Mexican connection with the "Pierce lines," and also a considerable system through purchase of the "Merriam" group of roads. But it does not influence the trans-continental or the Gulf situation to any marked extent. It is a good example of careful development on reasonably conservative lines.

The Rock Island road, running from Chicago to Denver and Fort Worth via Kansas City and Omaha, is of rather more strategic importance, but is so much "bottled up" on the Western side that it is powerless for much harm. It depends practically altogether upon Union and Southern Pacific for its Pacific Coast outlet, and thus is sufficiently under control. The Moore Bros. (of Diamond Match and, later, Steel Corporation fame) are currently believed to own a large, if not absolutely controlling, interest in this road, but its future is not giving the great "community of ownership" much cause for uneasiness at present.

Railroad History of Fourth Avenue, New York.

The *Evening Post*, discussing the interests of the householders in Park avenue, above 45th street, who object to the proposed changes in the railroad tunnel because they fear that the smoke nuisance will be worse than it now is, gives some interesting notes on the history of this important railroad line, which is the only railroad entrance to the heart of Manhattan Island.

Fourth avenue, beginning at the Harlem River, at the northerly end of the east side of the island, extends in a straight line south by west about six miles to Union square (14th street). That part of the avenue above 34th street is now called Park avenue. The present railroad terminus, the Grand Central Station, with its yard, extends from 42nd street northward to 48th street, and is several times as wide as the avenue, thus cutting the avenue into two parts.

The avenue was laid out, on paper, as early as 1811, to be a street 100 ft. wide; but it did not actually become a street until about 1850. In 1825 the city received the fee of the street, for certain portions, for use as a street. In 1831 the New York & Harlem Railroad laid out its line in the avenue from the river (138th street) southward to 23rd street, and the use of this line was authorized by ordinances of the Council passed Dec. 22, 1831, and Feb. 1, 1832. The city at this time carefully reserved the right to turn the railroad out, if it should become an obstruction, and also reserved the right to regulate the description of power to be used in propelling the carriages, and the speed of the same. This agreement was signed by the railroad company and, so far as can be learned, has never been modified, rescinded or superseded. It still holds unless subsequent state legislation has impaired the obligation of the contract.

At first the railroad's right of way was but 24 ft. wide (two tracks). The natural grade is very uneven; the Harlem flats (110th street) are very low, while at 94th street there is a hill of solid rock which had to be tunneled. When the railroad was built the company got deeds from some of the abutting land owners which purported to convey to the railroad, in fee, a strip in the middle of the street. In 1837 the city widened the street, on paper, to 140 ft., and between 1850 and 1853, as before stated, a highway was opened alongside of the tracks, both sides. This highway was not only parallel and close to the tracks but at places was at the same grade, with, of course, grade crossings at the transverse streets.

The Grand Central Station was built in 1871. At that time the passenger traffic of the Hudson River road was turned to this line, and the need of abolishing these grade crossings of streets at once became pressing. The work was finally authorized by the State Legislature in 1872 (chapter 702), this law authorizing the widening of the railroad to one of four tracks (50 ft.), and the abolition of grade crossings by cuts, viaducts and tunnels. The present so-called tunnel, most of which is an open cut, so far as the two central tracks are concerned, extends from 96th street southward to 56th (two miles). From 96th northward to 116th the tracks were put on a stone viaduct above the street level. At 116th street, going northward, the surface of the ground rapidly rises, and the railroad was built in an open cut. The transverse streets, every 200 ft., were carried across on bridges. The city and the railroad shared the expense.

This work was completed about 1875, but in less than 25 years it was undone.

In 1890 the Federal law was passed directing the replacement of the drawbridge across the Harlem River at 136th street by a new bridge 24 ft. above the water; and to accomplish the change of grade in the railroad, to conform to the new level of the bridge, the cut northward from 116th street was filled and the railroad (four tracks) is now carried on an elevated structure of steel. This elevated line extends from a point several hundred feet north of the drawbridge, southward, to 106th street. This improvement, costing two or three millions, was, like the earlier one, partly paid for by the city. This change was completed in February, 1897. The damages claimed by property owners in consequence of this last improvement amount to over $800,000, and the claims, it appears, are still unsettled. For damages due to impairment of easements of light and air due to the running of trains over the new viaduct, the Court of Appeals has held that the railroads running the trains are liable to pay.

Heating and Ventilating C. & S. Shops at Denver.

The *Engineering Record* of Oct. 12 gives a description of the ventilation and heating of the Denver shops of the Colorado & Southern Railway, from which the following is an abstract: "The Colorado & Southern Railway erected a short time ago a number of shops in Denver. A fan system of heating was decided on, warming altogether by the air circulated. The plant is interesting in its general proportions, a comparatively small number of outlets sufficing for buildings of somewhat large volume. Otherwise the installation is typical of hot-air systems for mill buildings using fans for positive circulation, the apparatus comprising fans, heater coils and overhead circular air ducts provided with short branches directing the air toward the breathing line and the portions of the building subject to the greatest cooling action. The fan-heater units are of the type in which the heater coil is on the suction side of the fan, and the air drawn through the heater is taken from the interior space of the shop, this resort to what might be considered the use of partially vitiated air being advised on the grounds that the apparatus is much less expensive in steam consumption, receiving the air at a much higher initial temperature than if taken directly from out of doors, and because a large proportion of the heated air on issuing from the distributing air pipes eventually reaches the outside walls and partitions of the shop, whereby it makes its escape into the outside atmosphere through the numerous openings and unseen points of egress which a building of this type of construction possesses. The air thus escaping is, of course, replaced by cold and fresh air that makes its way in largely through open doors. The apparatus was installed by the B. F. Sturtevant Co. The buildings heated comprise a machine shop and an erecting shop, these two buildings continuous with each other along one side, and a car shop and a wood-working machine room, the latter two adjoining each other at one end."

A New Third-Rail System.

The Rapid Traction Construction Co., Marquette Building, Chicago, has been formed to market an electric third-rail system invented by Mr. E. W. Farnham, Superintendent of Car and Special Freight Service of the Chicago, Burlington & Quincy. The company proposes to equip steam railroads and street car lines with this system and also to build and operate such electric roads. To show the working of the system a party of railroad men and others were taken to Clyde, Ill., on the Chicago, Burlington & Quincy, last Saturday, where a long siding has been equipped with Mr. Farnham's apparatus and an electric car was operated along this track. The third-rail is divided into sections and a section is charged only while a car remains in that particular section. The sections can be of various lengths.

The third-rail and feeders in the installation at Clyde are carried on supports alongside the track and are all enclosed in wooden trunking. Each truck of the motor car carries a contact shoe which always bears against the third rail and mechanically sets the switches which charge the sections of third-rail. At the ends of a section a short piece of the third-rail is suspended on knife edges and a feeder switch is placed at either end of this swinging rail; one switch being operated when the car moves in one direction and the other switch when the car moves in the opposite direction.

When the forward contact shoe engages the swinging section of third-rail, the friction is enough to carry the rail forward, closing a switch and charging the section of third-rail ahead of the car and before the contact shoe of the rear truck has left the section back of the car. The switch points are held in contact by a shunt-wound solenoid, one winding carrying current for the motors and the other a small current for lights or heaters. When the car leaves a section the arm carrying the carbon contact points falls by gravity, leaving the third-rail dead. By using the shunt winding and always taking a small current for lights or heaters, the contact at the switch is not broken when the current through the motors is thrown off.

The principal claims made for this system are that dangers from a charged third-rail, as now used, are avoided and leakage losses are greatly reduced. The location of the feeders and third-rail, whether alongside or between the running rails, can be made to suit conditions. The car at Clyde was operated satisfactorily last Saturday.

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EDITORIAL ANNOUNCEMENTS.

CONTRIBUTIONS—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussion of subjects pertaining to ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

ADVERTISEMENTS—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and these only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially either for money or in consideration of advertising patronage.*

On another page in this issue will be found an outline of the plan proposed by the M. C. B. committee for draft gear tests, as the result of a committee meeting last month. This plan will be presented for discussion at a meeting to be held Nov. 20, at the Auditorium Hotel, Chicago; the day following the meeting of the Western Railway Club. All interested in the subject are invited to attend this meeting. In brief, the committee proposes to first make drop tests and tensile and compression tests of draft gear. All reference to road tests has been omitted for the present, obviously for the reason that it seems best to take up the work in order and first of all determine definitely the strength and capacity of draft gear now being used. Then the committee will be in a better position to study the different types of gears under service conditions. As planned, the drop tests will be made at Altoona, Pa., at the same time that the tensile and compression tests are being made at Purdue University. It is expected to start the work by the middle of December. Even if the road tests of draft gear are not reached this year, there should be enough information collected from the laboratory tests to make an interesting report at the next convention.

A Canadian correspondent, commenting on our note of October 4, about noisy whistling, says:

"Would it not be an improvement in locomotive service to suggest two whistles, one for cross roads and stations, and the other a low-toned whistle for yard service and within the city limits? Modern requirements would seem to point to some such change. Whistles which had adjustable power would perhaps answer these suggestions."

Yes, that would be a desirable change, under some circumstances, if it could be discreetly managed. The idea has been tried, we believe, to a limited extent, but, so far as we are aware, with indifferent results. To have the loud whistle used only when it is needed, and the blasts made of the right length, it is necessary for the trainmaster, or some one who thoroughly appreciates the object aimed at, to spend a good deal of time in disciplining the men; this is a task which is very likely to be neglected and so the experiment is liable to result in satisfying nobody. But it is too obvious to need statement that a loud whistle is not needed in ordinary signaling, and a very mild one would be satisfactory in 999 cases out of a thousand. That is to say, the mild whistle could almost be said to be satisfactory for all uses. A loud whistle is needed chiefly for giving the stop signal for long freight trains and for alarming cattle and tramps on the track. But the first-named use is growing less and less important by reason of the use of air brakes; and in regard to the second it is probable that in the great majority of cases the alarms would be effective if given with a milder whistle. Any engineman or road foreman of engines can test this point by experiment if he desires to, as it is practicable to give a soft blast with most whistles. Experiments of this kind would be useful everywhere, for every superintendent is sure sooner or later to receive complaints about noise. The objection has been raised that an emergency whistle, used by rarely, would be so comparatively unfamiliar to enginemen that in case of emergency they would by force of habit use the milder whistle. This objection, however, is completely met by the suggestion of our correspondent, that the loud whistle be used every day. If it were not needed at all of the highways and stations it could be used regularly at a part of them, selecting those where noise would be the least objectionable. It would, no doubt, be easy to arrange the whistle-pull so that a pull of a certain length of stroke would open the soft whistle and a further pull open the loud one—after the manner of the air-brake valve.

The Pennsylvania Railroad Company recently ordered 2,000 box cars and has now asked for bids for 12,000 more cars of various kinds. In this immense order 11,500 are to be 100,000 lb. capacity cars; the other 500 are refrigerator cars. In the list we find 6,000 gondolas all of steel, 1,000 box cars of the American Railway Association standard dimensions with steel underframes; and all of the other cars ordered have steel underframes. The size of this transaction is in itself important, for it insures the expenditure of a good deal of money and occupation for the car builders for a considerable time in 1902. But the further facts that these cars are all of 100,000 lbs. capacity and that they are so largely of steel construction have a special interest. We have not been informed where these cars are to be distributed in the service of the company, but we should guess that they must be intended for service which will insure pretty steady loading. We have had serious doubts as to the wisdom of going up to 100,000 lbs. capacity for cars going into the general traffic of most of the railroads; but there can be no doubt of the wisdom of the policy of equipment of such capacity where it can be loaded a reasonable percentage of the time. The use of metal underframes in this great order will go a good way toward making that standard practice.

In the October issue of the *Journal* of the Western Society of Engineers is a long paper on a central terminal station for Chicago with considerable discussion of the paper. The paper is by Mr. R. C. Sattley; we shall not attempt to give any synopsis of it, for it is one of the kind of papers that cannot be very well treated by abstract. It is enough to say that he proposes to mass the passenger traffic of the railroads entering Chicago, except the Chicago North Western and Illinois Central suburban traffic. Those who are directly interested in this study would do well to get the *Journal* and examine the paper. The obvious objections are, the great first cost and the local congestion which would result from such a concentration of traffic. The principle of a union station is quite as likely to be wrong as to be right, and particularly in a city so immense as Chicago. In small towns the conveniences of union stations may be had without very great inconveniences, but in large cities this seems generally impracticable. Indeed the principle of scattering traffic among a number of stations is most likely to be economical and satisfactory. This was the guiding principle assumed by the engineers who recently undertook to make a plan for improving the Manhattan terminal of the Brooklyn Bridge, and the violation of this principle is one of the most formidable objections to a railroad bridge across the Hudson River. Without much more information than we now possess, we should say that a grand union station for Chicago is entirely out of the question.

The Probable Place of the "Traction Increaser" for Locomotives.

Within a few months we have had occasion more than once to speak of the traction increaser as designed for and used on the Central-Atlantic type of locomotives of the New York Central.

Recently Mr. John Player, of the Atchison, Topeka & Santa Fe, has designed and made application for patent on a traction increaser especially adapted to Prairie type engines, which also is intended to take weight from the front and rear trucks and throw it upon the driving wheels. The purpose is to use the device in starting and for heavy pulls over any critical point on the road while the normal weight on the driving wheels only will be employed elsewhere.

We are not yet prepared to go into anything like a final or exhaustive discussion of the merits and demerits of this apparatus or to risk making a prediction as to its probable future; but obviously the time has come when it should have serious attention from the designers and users of locomotives. If it rests on fallacies, the sooner those fallacies are recognized the better; if its usefulness is greater than the sum of the objections to it that fact ought to be ascertained and made plain. A contrivance which has been repeatedly tried and abandoned in the last 67 years is on its face subject to scrutiny. We will state now some of the objections which are offered to the use of traction increasers and leave it, for the present, to those who have had recent experience with it to determine whether or not those objections are important in actual practice and whether or not its obvious advantages outweigh the objections.

It is apparent that if a locomotive is fitted with the traction increaser a device is placed within the control of the engineman which enables him to increase the weight concentrated on the driving wheels of his locomotive, beyond what is assumed as normally safe for the line. There is no assurance that the device will not be used at points where it would be objectionable, as for instance on bridges, on soft track and on sections of road having light rail. The tendency of the engineman would be to take advantage of it often, just as the tendency is to work live steam in the low pressure cylinders of compound locomotives, notwithstanding the injurious effects of such practice. There is no adequate means of controlling this when enginemen are not under the eyes of a road foreman. If it assists the engineman in getting over the road, he will use it as often as he dares, and it is believed that broken or bent rails and strained bridges would be likely to follow its use. It is true that Mr. Player proposes to limit the use of the traction increaser to times when the engine is working in full gear, by making an automatic connection with the reverse lever; but yet the locomotive may be thrown into full gear and the traction increaser put into service under conditions least favorable for carrying the increased weight.

A certain weight carried on the leading truck is necessary for its efficiency. The design of the locomotive should be such that the truck does not carry an excessive weight or a weight considerably beyond that necessary to give it the adhesion for properly guiding the engine. If, therefore, a considerable amount of weight is withdrawn from the truck, to that extent it becomes an idler, and the duty of guiding the engine is transferred back to the rigid wheelbase. The conditions then are approximately like those of a switching engine, without trucks, and with a long over-hang front and back. To work such an engine as a road engine at considerable speed may become dangerous and would certainly increase the injurious effect of the engine upon the track.

If a locomotive is cylindered to suit the normal weight it will be under-cylindered for the additional weight resulting from the traction increaser. If cylindered for the maximum weight the cylinders will be too large for economical running under normal conditions.

We have said that this sort of mechanism has been tried and abandoned in times past, and it may be well to call to mind again some specific history. Last March (page 226) we showed a traction increaser patented by Mr. Henszey in 1880. This was used on a single-driver engine built in 1881 by the Baldwin Locomotive Works for the Philadelphia & Reading. This locomotive was afterwards sold to the Eames Vacuum Brake Company and named the Lovitt Eames. But this design had been anticipated by Mr. Baldwin in 1848 on the Governor Paine of the Central Vermont, and, in fact, the American history goes even further back. In the catalogue of "Narrow-Gauge Locomotives," printed in 1897, by the Baldwin Works, page 20, we find the following interesting historical note:

In June, 1834, a patent was issued to Mr. E. L. Miller, by whom Mr. Baldwin's second engine was ordered, for a method of increasing the adhesion of a locomotive by throwing a part of the weight of the tender on the rear of the engine, thus increasing the weight on the drivers. Mr. Baldwin adopted this device on an engine built for the Philadelphia & Reading Railroad Company, May, 1835, and thereafter used it largely, paying $100 royalty for each engine. Eventually (May 6, 1839) he bought the patent for $9,000, evidently considering that the device was especially valuable, if not indispensable, in order to render his engine as powerful, when required, as other patterns having the driving wheels in front of the fire-box and therefore utilizing more of the weight of the engine for adhesion.

The locomotive mentioned above as Mr. Baldwin's second engine was ordered for the Charleston &

Hamburg Railroad Company. This locomotive was finished Feb. 18, 1834, and was named the E. L. Miller.

We do not take time now to hunt down the records of various arrangements for transferring weight from carrying wheels to driving wheels, but have mentioned these few convenient examples merely by way of verifying our statement that the history is a long one. We are not writing with mind made up against the practicability of the traction increaser, but with the hope of tapping some streams of learning and experience.

Annual Reports.

Minneapolis & St. Louis.—Some fluctuation is to be noted in the different classes of the tonnage of this company in the year to June 30, a fact not surprising in view of its position as a spring wheat carrying line; but this does not appear in the revenue accounts, which show uniformly large gains over 1900 figures. Thus, freight earnings gained $295,580, or 14 per cent.; passenger receipts, $102,000, or 17 per cent.; and gross earnings, $412,194, or 14½ per cent. Net earnings gained $164,017, or 13 per cent., and surplus available for dividends was $553,760 in 1901, against $415,000 in the previous year. Dividends were increased, through the payment of 4 per cent. on the common shares, so that the surplus carried over into the new account was less than in the previous year.

Mileage operated has increased from 577 on July 1, 1900, to 642 miles on July 1, last, average miles operated being 633 last year, or 118 miles more than in the previous year. Allowing for this additional mileage worked, gross and net earnings, per mile, show actual losses in 1900, the decrease in gross per mile being $394 and in net $233. This increase in average mileage is virtually all accounted for by the Southwestern extension, built in 1900, a portion of the line having been completed in that fiscal year, and 68 miles taken over on July 1, 1900. This new line, however, was financed in 1900, so that there is no increase in the 1901 charges on its account and the increase in net earnings after taxes was practically all available for dividends. The bonded debt was increased in the year by issue of $351,000 for real estate, etc., but these bonds, together with $200,000 previously issued, are held unsold in the treasury. The company did sell $100,000 common stock out of the treasury holdings during the year.

The transportation results reported by the company deserve special mention, for the steady yearly progress shown and for the high records made in train loading, train mile earnings, etc. Thus, in 1901, when the normal movement of traffic must have been much disturbed by the failure of the spring wheat and the decrease in flour business, the average revenue train load was increased by 37 1-3 tons to a total of 289 tons, a figure which compares well with any road operating in the same territory. This train load was obtained with 33 per cent. of the 1,766,000 tons moved, consisting of grain, but with no other commodity except flour, 186,000 tons, amouting to 10 per cent. of the tons moved. Sixty-four per cent. of the total tons moved and 52 per cent. of the freight revenues were through business. Ton-mile rates fell off from 1.145 cents to 1.212 cents; freight train mile revenues rose by 27 cents from $3.04 to a total of $3.31 per train mile, a figure which ranks very high for a grain carrying road in the Northwest.

New Zealand Government Railways.—The annual report of the Minister for Railways of New Zealand, covering the report of the General Manager and other officers, is received. The report is dated Sept. 4, 1901, and is for the year ended March 31 last. The lines open for traffic at the end of the year amounted to 2,212 miles, the increase during the year having been 108 miles. The private lines are about 170 miles; these are not covered in the Government report. The gross revenue amounted to £1,727,236, the working expenses (65.3 per cent.) to £1,127,848 and the net earnings from working, £599,389. The capital cost of the lines open for traffic was £17,207,328 and the interest earned amounted to 3.48 per cent. There was considerable increase in passenger travel and passenger revenue, which is considered very satisfactory in view of large reductions made in passenger rates in June, 1900. The freight traffic also increased. The total train-mile revenue for the year was $1.87 and the cost per train-mile $1.22, which figures indicate rates that in this country would be high. The cost of working, however, is considerably raised by the fact that the railroad lines of the Colony are scattered, there being many pieces where the haul is so short that it can scarcely be profitable, even at high rates.

The management points out that it is desirable to connect up the short lines as fast as possible and also that improvements of road and rolling stock are desirable to permit the use of heavier engines. During the year some track was relaid with 56-lb. rails, but 70 lbs. has now been adopted as the standard, and the next order from England will be of that weight. Locomotives under order in Great Britain and America, together with new locomotives and rebuilding in hand in the Colonial shops, will increase the tractive power about 46 per cent. The Locomotive Superintendent says that extensive additions must be made to the workshops to permit a supply of locomotives and other rolling stock to be built in the Colony. There should be provision for building at least 10 large locomotives each year. The total locomotives in service now are 305; cars, 603; brake vans, 24; wagons, 10,627.

Among improvements under way is the further fitting of rolling stock with the Westinghouse brake, and it was expected that express service on the Wellington-Napier-New Plymouth section would be supplied with this brake early in the financial year. Furthermore, 63 vehicles were fitted for lighting by Pintsch gas during the year, making a total of 502 cars and vans so fitted to date. Interlocked signals were extended during the year, the material having been imported from England. Further, it was decided to adopt Tyer's train tablet system for certain lines, and where the traffic is light it is proposed to use the staff and ticket system. It appears that there has been considerable effort to have the Department use more New Zealand grown ties instead of importing from Australia. Complaints have been made that the inspection is too rigid, but the Chief Engineer holds that the inspection and requirements are absolutely necessary to get ties adequate for his service, and the Minister approves of this view. However, arrangements are making for building two creosoting plants capable of dealing with about 200,000 ties a year, and in this way perhaps the use of New Zealand timber will be extended.

London & North-Western.—The report of the London & North-Western for the half year ending June 30 last was presented at the general meeting Aug. 13 and the full report has recently come to us. In that half year the company earned £6,547,856, the decrease from the corresponding half year in 1900 having been £71,529. The working expenses were £4,276,197. Including miscellaneous receipts and after paying interest and rents the amount available for dividends was £1,761,141. Dividends were declared at the rate of 4 per cent. per annum on guaranteed and preference stock and 4½ per cent. on consolidatd stock, this last item being 1½ per cent. less than in the corresponding period. The sum thus distributed amounted to £1,728,222. The passenger receipts increased, but the freight receipts decreased over £100,000. The tons of freight carried in the half year fell off 1,763,308 and amounted to 20,873,396. Train mileage decreased both in passenger and freight service. The company owns in whole 1,715 miles of road, owns partly 111 miles, and leases 87, making a total of 1,912. Its engines run over a considerable mileage of foreign lines, bringing up the amount of road over which North-Western engines work to 2,944 miles.

New South Wales Government Railways.—The Railway Commissioners of New South Wales report results of working for the year ending June 30, 1901, their report being dated Aug. 19. The miles open for traffic on June 30 amounted to 2,845 and the capital cost to £38,932,781. The average miles worked during the fiscal year amounted to 2,818. The gross earnings were £3,573,779, the working expenses £2,043,201, and the net £1,530,578. This was an increase of £136 526 in net, as compared with the year 1900. The total train miles run was 10¾ millions, the increase having been 1,869,000, which increase was largely due to the greater volume of traffic and to the necessity for running auxiliary trains to relieve the mail trains; but it was also added to by an arrangement agreed upon between the various states for securing uniformity of mileage returns under which every train drawn by two engines has been calculated as two trains instead of one train, as was formerly the case. The growth in revenue (£410,207) was the greatest yet recorded and all classes of traffic contributed to it.

The earnings per mile of road worked, gross and net, were not heavy; that is, the gross in the year was about $6,300 and the net $2,700. The Statistician of the Interstate Commerce Commission makes the corresponding figures $7,722, and $2,729 for the United States. Per train mile the earnings amounted to $1.65, and the net to 70 cents. The total ton-miles of all classes of freight amounted to 404,740,360, and the average rate to 2.26 cents per ton per mile, as compared with our 7.29 mills, or almost exactly three times as much. But it is pointed out that 84.19 per cent. of the freight traffic was carried at an average of 1.04 cents per ton mile, and some of it as low as 7.8 mills. It will be observed that this report is peculiar among railroad reports from Great Britain and the Colonies in giving ton-miles and passenger-miles. It will be observed, too, that the minimum rate was pretty low while the average is not as high as one might expect in a country of thin traffic. Yet the final result, after paying working expenses, left 3.66 per cent. available for interest on the capital.

It has been necessary during the year to make considerable concessions in rates, as for instance, rebates in connection with the carriage of starving stock and fodder because of prolonged drouths, and it is the intention hereafter to apportion a part of the surplus of the year's workings among the users of the railroads by reducing rates to the value of between £50,000 and £60,000 a year. The traffic so affected will be wool, grain sacks, fencing wire, agricultural produce and sugar.

The improvements going on and projected are of somewhat particular interest to American readers. Steady progress has been made in interlocking points and signals and in the use of safety appliances in general. The rolling stock must be considerably augmented and 40 locomotives, 950 4-wheel, 15-ton, freight trucks, 46 carriages and 43 brake vans were under order to be delivered within the half year following the date of the report. During the year 10 locomotives were added to the material of the roads with a few trucks and suburban cars, the cost of these having been charged to capital account. Some engines were rebuilt in the company's shops, as were cars and other material, and charged to working expenses. A good deal of money must be spent in the next few years in relaying track. In recent years work of that kind has been going on and the number of ties per mile has been increased by more than 10 per cent. and the weight of rail 14 per cent., all of this having been charged to working expenses. The reader is doubtless aware of the repeated efforts to have rails made in the Colony, all of which have failed, and no doubt for a good while to come the new rails will be bought abroad, either in Europe or the United States.

An official report concerning locomotives in Russia shows that at the end of the year 1900 the total number in the empire was 12,187. One year earlier in the United States, with eight times as many miles of railroad, there were only about three times as many locomotives. The Russian stock includes no less than 171, which were built between 1850 and 1860, 1,782 date between 1860 and 1870, 3,684 between 1870 and 1880, 1,326 between 1880 and 1890, and 5,224 were built in the last decade of the century. Of the whole number in 1900 5,647 (46½ per cent.) used coal for fuel, 4,336 (35½ per cent.) petroleum, and 2,204 wood. The number of the locomotives built in Russia was 7,421, or 61 per cent. of the whole, and most of these have been built since 1890. It is easy to see that for a country like Russia, liable to be cut off from the rest of the industrial world by war, national locomotive works are almost as indispensable as arsenals; but it is questionable whether the favoring of the home works has not gone too far. Examples of the cost of foreign and domestic locomotives are as follows, the figures for the foreign ones including import duties: Between 1896 and 1899 one railroad bought 103 engines of similar size and design; 40 of these, built in Cassel, cost $18,995 each; 30 built in Hanover, $412 more, while the 33 built in Russia (Brjänsk) cost $19,317. In 1894 out of 73 engines of like pattern the 63 built in St. Petersburg and Brjänsk cost $16,737 each, and the 10 ordered in Vienna $14,162. In 1898 20 Baldwin locomotives cost $13,402 each; the next year 30 very little different cost in Brjänsk $18,643. Quoting these figures the organ of the Ministry of Finance says that since the government has given 84 per cent. of its orders to the home works in order to establish them, now that they are established they ought to reduce their prices. The works, however, have to import a very large part of their materials and pay high duties on such imports. This organ admits that the works furnish good engines; but it is noticeable that the private companies which are free to do so order chiefly abroad; though the above cited difference in prices explains that.

Traffic statistics for the first half of 1901, published by the Russian Ministry of Finance are not altogether without interest here. The tonnage of coal decreased slightly, compared with 1900, which is what might be expected from the less activity of iron works and factories; but the movement of refined petroleum increased from 71.819 to 90,818 carloads, and of crude from 69,277 to 77,830. The movement of grain to exporting ports and border stations decreased somewhat; but the most interesting statement is concerning the receipts of Archangel, which were 668,700 bushels by rail and 2,754,600 bushels by the River Dwina, more than five times as much by rail and two-fifths more by river than in 1900. Archangel receives grain chiefly from Siberia.

NEW PUBLICATIONS.

Master Blacksmiths' Association.—The official report of the ninth annual convention of the National Railroad Master Blacksmiths' Association, held at Denver last August, now appears in pamphlet form. It may be had from the Secretary, Mr. A. L. Woodworth, Lima, Ohio. The papers and discussions were reported at considerable length in the *Railroad Gazette*.

TRADE CATALOGUES.

A Wrought Steel Passenger Truck.—The J. G. Brill Company, Philadelphia, Pa., and 110 Cannon street, London, have issued an October pamphlet describing the Brill No. 27 truck. This truck has been doing its work for something like six years and has gradually been adapted to a great variety of conditions. The principle of the truck remains the same. It has three sets of springs in series, and in all of the forms of the truck the elastic swinging links are retained. Perhaps the most important detail change is the use of solid forged frames. The pamphlet is very intelligently prepared and illustrated.

Electric Car Heaters.—The Consolidated Car Heating Company, of Albany, N. Y., has issued a pamphlet describing its electric heating equipment for cars. We are informed that the company has in the last nine years equipped over 1,400 cars, involving the use of more than 190,000 heating coils, while equipment furnished in 1892 is still in regular service. The writer of the pamphlet says: "A short coil of high-resistance wire having a small surface must necessarily operate at an excessively high temperature, in order to dissipate the same amount of heat as the longer coil of low-resistance wire having a much larger surface. In this principle lies the success of the Consolidated Electric Heaters, which have a

large heating surface and operate at a moderate temperature." The various apparatus made by the company is shown by engravings and described, and information is given as to the selection of heating equipment and as to its installation and use.

The Chicago Pneumatic Tool Co., Chicago, has issued a 9½ x 12-in. catalogue of 64 pages, which is one of the most attractive trade publications we have seen. It is No. 15. The plan of showing by illustrations the great variety of work now done by the Chicago pneumatic tools has been carried out in great detail, and impresses one with the importance of this business. There are 22 pages of engravings showing chipping and calking hammers, riveting hammers and various frame and yoke riveters. These are also shown working on different kinds of structures. Drills and boring machines are illustrated in the same way on 10 pages. Other devices shown are: Painting machines, flue cutters, staybolt nippers, adjustable repair tables, compressors, air hoists, motor driven chain hoists, pneumatic revolving and traveling cranes, pneumatic jacks, Boyer speed recorders, air compressors and storage tanks. A number of views are given of the exhibit of the Chicago Pneumatic Tool Co. at the Glasgow Exposition and of notable work on which the tools have been used. In a supplement of 14 pages all the parts of all the different tools are shown with the numbers to be used in ordering repair parts.

To Provide for the Railroad Business of the St. Louis Exposition.

In the October *Proceedings* of the St. Louis Railway Club is a group of papers on the arrangements to be made for handling the traffic at St. Louis before and during the Louisiana Purchase Exposition. The award of the prize for the best of these will be announced in November. Below are a few extracts from the papers.

BY MR. WILLIAM R. BRANNAN, *Engineer Vandalia Line.*

The City of St. Louis, from the East, is like a mediæval castle, that can only be entered through two narrow gateways, across a deep moat. . . . We are confronted with the problem of using these two small places of entrance to handle probably the greatest number of people ever gathered together in the United States. Recognizing the difficulties before us, we must endeavor to secure an exact idea of our present facilities and the possibilities they possess towards handling these people. . . .

The national G. A. R. encampment was held in Indianapolis in 1893, a few years after the new union station was completed; a station its builders believed to be planned in such a manner as to be equal to any possible demands upon it. . . . Nothing better could be devised, yet all during the week of the encampment the greatest difficulty was experienced in handling people, and the delays to passenger trains were many and exasperating, all the roads suffering from this cause. The great delays to passenger trains disarranged all freight trains, and each department of all roads suffered, all because of this one congested point.

Yet it is not quite correct to say all lines suffered, for amid all this turmoil and confusion one branch line of the Panhandle system had no delays worth mentioning—the J., M. & I. While all was "confusion worse confounded" upon every road entering Indianapolis, this line alone was able to get trains into and out of the city practically on time. Only one man fully understood the situation and realized the inadequacy of the Indianapolis station to care for the vast number of visitors. Knowing this, he anticipated the trouble that was certain to arise if an attempt was made to get all trains into and out of the Union Station. He also remembered the experience of the P. R. R. in Philadelphia in 1876, and this man, the trainmaster of that division, set about to save his own division trouble, and the way he did it will, I believe, solve the greatest difficulty likely to arise at St. Louis. The plan followed was to establish a substation at a point giving easy and convenient access to all parts of the city by street car lines, the station fully manned by a full complement of employees, depot master, station agent, baggagemen and porters, all intent upon the comfort and safety of passengers. All persons entering the city were fully instructed before reaching Indianapolis to leave the train at the sub-station, and also fully informed that departing trains would leave from the sub-station and not from the Union Station. . . .

With the great number of roads entering St. Louis it is not only necessary, but imperative, that a complete system of information be secured between the different roads and the officials of the Terminal Railroad Association. The best method to be pursued will be for each road to appoint one man, to be stationed in St. Louis, whose principal duty shall be to have full charge of all trains into and out of St. Louis on his own road, this man to be kept fully advised by his own people as to all their requirements of train movements, he alone to be in direct communication with the Terminal Railroad Association officials. This man shall be kept fully posted upon all matters connected with his road, so as to be able upon a minute's notice to give accurate and exact information to the Terminal Railroad Association as to when trains will reach St. Louis and when trains are to leave. This person must always be in possession of such information, expecting to be called upon at any and all times by the Terminal Railroad Association, and it must never be necessary for him to await advices from his own road, save upon extraordinary occasions. He should have full and complete power and authority over the movement of all trains upon his own line, so that upon no occasion will it be necessary for the Terminal Railroad Association to apply to anyone else for advices regarding the movement of trains of his line or their full disposition. As this matter is so important, I wish to impress it very clearly upon your attention, and at the risk of reiteration, I repeat, this man should be empowered to do any and all things necessary in the handling of trains and passengers on his own line, and to direct the movements of all trains, engines and crews, so that prompt and satisfactory service may be given by the Terminal Railroad Association. . . .

The present station, commodious and convenient as it is, will be wholly inadequate to successfully handle the immense throngs of people so sure to attend. Now, the best and only solution will be an extension of the plan followed on the J., M. & I. at Indianapolis, all efforts being directed towards the one end of relieving the Union Station as much as possible, so that the mistake made at Indianapolis will not be repeated.

First and foremost, sub-stations should be erected, by all roads coming from the west, at a point most convenient to the street car lines. . . . A sub-station should also be erected at the west end of the Merchants' Bridge, where all passengers for the exposition and for St. Louis proper can be handled, the station to be at a convenient point for passengers to take the street cars, through passengers only going to the Union Depot. . . . These sub-stations should be as fully manned and equipped as any station anywhere; each as much so as if it were the only station in St. Louis, including a bureau of information and neat, commodious and comfortable waiting rooms, with attendants in the women's compartments to look after the comfort of the women and children. . . .

I take it that passengers from the east on trains using the Eads Bridge can only be handled by going into the Union Station, for I believe it impracticable to try to use the Washington Avenue Station for the handling of the increased travel which the great exposition will surely bring; besides, this station is so dangerously located as to make it a very great risk to life and limb in attempting to handle passengers there, and a risk that seems too great to be warranted.

The most difficult problem seems to me to be the tunnel. . . . It seems to me to be imperative that a perfect system of ventilation be adopted, yet the adoption of this system alone, while it would be a great improvement, is not sufficient. The smoke and cinders must be done away with entirely, and a system of handling all passenger trains, at least, by compressed air or electricity, whichever can be best used, should be inaugurated. Generally speaking, considering the location, I should say that electricity would give the best satisfaction, although late improvements in the use of compressed air seem to leave room for doubt. . . . The change to compressed air could be accomplished at less cost in making changes in the tunnel. The only thing absolutely necessary to change and improve in the event of using compressed air would be to secure additional air shafts and a better ventilation. There are in present use engines using compressed air that could then be used without necessitating any expensive change in the tracks themselves. Any system of electricity adopted, so far as I am informed, would necessitate a radical overhauling of all the internal fixtures and appliances of the tunnel. It is true, storage batteries might be adopted with but little change in the tunnel, but I do not believe the adoption of that system would be at all satisfactory, and the expense of operation would be very great; much greater, I believe, than either of the other plans.

All baggage and express for the city proper, as well as for exposition passengers, should be handled at the sub-stations, buildings and sheds necessary being erected. All baggage and express cars in all trains should be switched before going into the Union Station, and separate buildings erected at which to do this work, reserving the Union Station with all its facilities for the handling of passengers alone. As before stated, all efforts must be directed towards relieving the Union Station proper from unnecessary work, for the work that will have to be done there will tax its capacity to the utmost. . . .

All tickets sold to World's Fair passengers should be of a striking color, a color used for no other class of tickets; each road should adopt a particular color. All agents and employees who have charge of passengers should take the utmost care to see that every passenger is fully informed as to using the sub-stations, both coming to the exposition and returning home. . . .

Special trains bringing in excursion passengers for the World's Fair alone ought to be unloaded at the sub-stations and not be run into the Union Station at all, but turned over to the Terminal Railroad Association to be switched; the same thing should be done with all trains composed of baggage and express cars not containing through baggage and express material.

There are at present two grave defects in handling the business at St. Louis Union Station, both of which should be remedied and both of which ought to be avoided at the proposed sub-stations. The first is lack of sufficient bureaus of information. There should not only be a special bureau of information established at each sub-station, but every employee should have it fully impressed upon him that he is a part of the system to accommodate the traveling public, and should be able to answer all reasonable questions, thus relieving the general bureau of information. The second is lack of bulletin boards giving the arrival and departure of trains. The Union Station should have a number of new boards put up, even for present travel, to say nothing of the great increase in travel to be anticipated. Bulletin boards at the various sub-stations should be large enough not only to give the arrival and departure of all trains, but to contain such items of general information as will be most likely to relieve the bureaus of information, and thus prevent a blocking of the people about these places. . . .

BY MR. JOHN J. BAULCH, *Traffic Manager, Interstate Car Transfer Co.*

The first three points I would establish are:

First. The ownership of the switching yard outside of the exposition grounds; also the receiving and the delivery tracks from and to the connecting railroads and independent switching and belt lines, together with all rail laid inside the exposition grounds, and the power necessary to move all traffic, the interlocking and the telephone systems should all be vested in the Louisiana Purchase Exposition Company.

Second. These should be built and operated by that corporation.

Third. All revenue derived therefrom to go to that company's treasury. . . .

The World's Fair terminals should be a separate and distinct organization, and here let me again emphasize. The Louisiana Purchase Exposition railroad scheme should control absolutely the yards outside of the fair grounds and all rail laid inside, independent of any railroad, and as the location is now fixed, there will be no trouble to organize an independent World's Fair switching line, with its own yards, power, management, tariff and various departments necessary to accomplish the work, and by way of explanation, here let me suggest why the officer in charge should know St. Louis terminals thoroughly. Even with an independent organization, contractors, builders, exhibitors, etc., will want their shipments looked after and taken care of long before they reach St. Louis or East St. Louis, and a full knowledge of where to go and how to go at it will serve to relieve much friction. . . .

The yard should have a capacity of not less than 5,000 cars, which means about 100 miles of track, upon which to handle the traffic successfully and promptly. The yard must be modern, the receiving and delivering tracks numerous and handy of access to the railroads and belt and switch lines, for the railroad project must be planned and executed on the broadest and most liberal lines, anticipating any possible heavy movement of cars of material or exhibits which might result in the congestion of traffic. . . . With about two exceptions there is not a railroad or a switching line in or around St. Louis or East St. Louis that to-day has facilities sufficient to carry on business without a hitch or more or less delay and congestion with traffic running along at normal; in fact, the facilities are entirely inadequate, and it is a well-known fact that at certain periods every year the yards are filled beyond their capacity, badly congested, and traffic is delayed. . . .

The passenger station, or stations, should be outside of the fair grounds proper, on their own rails, but close to one of the entrances, and (to digress for a moment) I doubt if any gentleman who hears this paper failed to watch and wonder at the magnificent service furnished by the Illinois Central during the World's Fair at Chicago in 1893. Never before or since has the feat been equalled, and it stands to-day a monument to the wisdom, sagacity and energy of that wonderful American railroader, Mr. J. T. Harahan, who, with limited time, but unlimited ability, energy and money, worked out the problem of raised tracks, bridges, streets, ample rolling stock, in the shape of specially devised passenger cars; express and local service over four tracks; ready ahead of time, and operated with such perfection that, although carrying millions of people in the six months' duration of the fair, got through without a fatal accident. . . .

BY MR. H. J. PFEIFER, *Asst. Engr. T. R. R. A.*

. . . By referring to the annual report of the Merchants' Exchange of St. Louis for the year 1900 the following facts are noted: First, that the railroads centering in St. Louis received during the year 15,375,441 tons of freight and shipped 9,180,309 tons, or a total business of 24,555,740 tons into and out of the city during the year. The average load per car during the year crossing the Eads Bridge was 18,526 tons. On this basis of tonnage per car St. Louis received 787,434 and shipped 470,158 loaded cars, a total year's business of 1,257,592 loaded cars. A comparison of this tonnage with that of previous years, as far back as 1897, reveals the fact that for the past four years the freight tonnage at St. Louis increased at an average rate of about 11 per cent. per annum. A continuation of this same rate of increase up to and during the year 1902, the period of heaviest construction for the fair, will give the railroads a business amounting to a total of 1,549,479 carloads, irrespective of any increase due to the World's Fair.

During the construction and installation period of the Columbian Exposition at Chicago, extending from June, 1891, to July, 1893, there were received at Jackson Park 36,407 carloads of building materials, coal and supplies and 7,900 carloads of exhibits, making a total of 44,307 carloads received during a period of two years, or at the rate of 22,153 per year. Since the Louisiana Purchase Exposition will be of about the same magnitude as the

Chicago Fair, 25,000 cars per year during the fair construction period is a fair estimate of strictly World's Fair business. In addition to this, however, there will be quite a volume of business, not directly connected with the Fair, but due to it, such as the carriage of building materials for hotels and other structures to be erected on account of the Fair, for which provision must be made. This business will probably not exceed that for the Fair proper, amounting to 25,000 carloads per year. On this basis the World's Fair will add about 50,000 carloads to the year's business, an increase of only 5 per cent. in the estimated amount of freight that will be handled during the year 1902. There will be, therefore, no necessity for an increase in freight facilities at St. Louis on account of the Fair, and if anything of the kind is found necessary it will be due to the normal increase in business.

The freight situation at the Fair grounds presents a somewhat different aspect. Here special facilities must be provided for the expeditious distribution and storage of a great variety of materials. With an annual business of 25,000 carloads there will be weeks at a time in which the daily receipts on the grounds will amount to at least 200 carloads. Allowing an average of six days for unloading and the return of the empty car, there will frequently be 1,200 cars for which track room must be provided. Of these 1,200 cars perhaps 300 will be scattered on the various delivery tracks throughout the grounds; for the remaining 900 a storage and ranging yard will have to be provided. A yard with about 30 tracks of 40 cars capacity each, with double track switching leads at each end, is ample for all purposes. . . .

All tracks, warehouses, etc., on the grounds should be owned by the Fair company, and all movements over the rails within the Fair limits should be under its control. A terminal superintendent or manager should be appointed and given entire charge of all railroad matters within the grounds. . . .

The next feature to be considered is the passenger business. Here, again, it is necessary to get an approximate idea of what is to be expected, what can be done by present arrangements and what additions and changes must be made to existing facilities to provide for the prospective increase in business. At present all passenger trains coming into St. Louis, except a few local accommodation trains, arrive at and depart from the Union Station. A reference to the "Eleventh Annual Report of the Terminal Railroad Association of St. Louis" discloses the fact that during the year 1900, 356,996 passenger cars, including baggage, mail and express cars, an average of 953 cars per day, were handled into and out of the Union Station, being an increase of 19,303 cars over the number handled during the previous year, equivalent to an increase of 5.7 per cent. for the year. Assuming the same rate of increase for the next three years, 421,489 passengers cars, an average of 1,155 cars per day, will enter or leave the Union Station during the year 1903, without taking into consideration any increase in business due to the World's Fair. At present almost the entire passenger business at the station is handled between the hours of 7 and 9 a.m. and 7 and 9 p.m., during which times the station is a very busy though not overcrowded place. The same amount of business per hour that is handled at these times could be handled, so far as the station is concerned, during every hour of the day, provided there was sufficient passenger coach storage space to hold the empty equipment. On this basis 4,800 cars per day could be handled into and out of the station without any change in the present track arrangement.

The station track arrangement can, however, be modified at a cost which is not excessive, so as to handle trains, if necessary, at a rate of 60 per hour into and 60 per hour out of the station. Of course, in order to do this the baggage rooms must be enlarged and baggage trucked either over the tracks on bridges or underneath in subways.

On the basis of 20 persons per car the normal business in 1903 in and out of the Union Station will amount to about 23,100 passengers per day, not taking into consideration World's Fair business. In Chicago the heaviest attendance at the fair was something like over 700,000 people on Chicago day, the next heaviest was 340,000 on Manhattan day. The average attendance during October, the biggest month of the fair period, was something over 200,000 people per day. It is safe, therefore, to assume that on no one day during the Chicago fair were there more than 250,000 strangers within the city. Each person that came to the exposition probably averaged at least five days in Chicago. This would mean an average of 50,000 people per day coming into and going out of the city every day, making a total of 100,000 per day.

In St. Louis similar conditions will probably prevail, so that 120,000 persons per day into and out of the station is probably a high estimate of passenger travel during the World's Fair period. When travel is very heavy the average number of passengers per car is about 40. At this rate it will require 3,000 cars per day to handle the business. This means 167 cars per hour of an 18-hour day, which is equivalent to 28 six-car trains per hour. Storage capacity for about one-half of this equipment, say 1,500 cars, will prove ample for all emergencies, since the average lay-over for trains in St. Louis is about 12 hours, thus keeping about half of the cars on the road or at the other terminal.

It will be seen from what has been said that the passenger business during the Fair presents no difficulties which cannot be overcome by means of present facilities at Union Station, with a few additions in the way of increased storage capacity for passenger equipment, more space for the ticket and baggage departments, a subway or overhead truckway for baggage and express, thus avoiding the crossing of tracks at grade, as is now done, and some changes in the track arrangement at the Station to facilitate the movement of trains.

While the greater part of the crowds attending the Fair will probably be handled by the street cars, especially that portion of them living or boarding in the residence districts of the city, there will, nevertheless, be a demand for a rapid and convenient communication between the heart of the city and the Fair grounds, which the street car companies cannot furnish, and which can be supplied only by the steam roads, running as they do on their own rights-of-way and not through the congested streets of a World's Fair city. By means of a combination of the Wabash Railroad, the Terminal Railroad Association of St. Louis, the St. Louis Merchants' Bridge Terminal Railway and the belt line now being built by the Terminal Railroad Association, a World's Fair passenger belt line could be formed which would easily transport 30,000 people per hour, giving each passenger a seat, and which could, without much crowding, have its capacity increased to 45,000 passengers per hour. . . .

Train Despatching.*

Train despatching with other branches of railroading, has developed from small beginnings. As soon as it was seen that the electric telegraph was a success, wires were erected along the various railroad lines and it was the practice for quite a period for conductors to do their own despatching. This was done in a crude way and in most cases was simply a message from one conductor to another. For instance, in case No. 1 was late the conductor, if he was feeling good natured, and was on friendly terms with the conductor of an opposing train, with which he had a meeting point by time table, would send him a message to use a certain number of minutes of his time or perhaps he would make a positive meeting point between the two trains; also conductors of passenger trains would, when occasion required, send messages to freight trains giving away some of their time. As business began to increase, especially during the Civil War, it began to be seen that train orders must be handled from headquarters. On many roads, however, train despatchers were not appointed at first, but orders were issued by the Superintendent personally, or in his absence by a representative, usually his clerk. This method was, however, soon outgrown on all but the smaller lines and regular despatchers put on. There were no standard rules then, and there were hardly any two sets of rules alike, but the single order system prevailed everywhere, with the occasional occurrence of the dreaded "lap order," which has been the undoing of many old-time despatchers. This chance of error has now entirely been done away with by the universal adoption of the double order system. This is so simple that it seems strange to us that there was ever any other way of sending orders. All there is to it is sending the same order to each train affected and if possible at the same time.

There is considerable difference of opinion as to what should be the normal position for train order signals. Conditions vary so decidedly on the different railroads and often on different divisions of the same road, that it is perhaps impossible to have a general rule that would answer satisfactorily in all cases. When the road is single track, especially if a heavy business is handled, it seems to me that danger as the normal position is the safer. It certainly keeps operators in closer touch with the trains and is a great preventive of the night operator sleeping on duty, as he knows he will be called "on the carpet" if he stops trains unnecessarily. When the normal position is at safety trains can pass the signal sometimes without the knowledge of the operator, particularly if he is a sound sleeper. This is the beginning of trouble. The despatcher who is watching the time the trains are making calls the operator steadily perhaps five minutes, although some operators wake easier. The constant reiteration of the call finally penetrates and makes its way into the shadows of dreamland and gradually draws the sleeping operator back to earth. He begins to rub his eyes, sits up on the bench where he has been lying, yawns and stretches. He suddenly notes that the sounder is savagely repeating his call, and hearing the despatcher's signal, he knows there is a "call down" for him. He steps to the key and answers. The first question is usually, "Well! where have you been?" with emphasis on the well. There are quite a number of stock excuses. The operator has either been out to get a drink of water, a hod of coal, or perhaps has been fixing the batteries or possibly his relay was not adjusted. It is rare, however, that he will admit that he has been asleep, as that is considered a serious offense and is severely punished—at least if persisted in. The despatcher inquires if a certain train has passed. Mr. Operator is in a quandary. He does not think it has, as it would probably have wakened him, but if he says it has he will have to give the time and that would probably be wrong, so that his neglect of duty would be readily detected. Sometimes he will own up and say he has been asleep, but occasionally there will be an operator who will take chances and inform the despatcher the train has not passed. If the suspicions of the despatcher are not aroused, and he believes the train has not passed, he then sends an order, giving this train and one in an opposite direction a meeting point, depending on the sleepy operator to stop the train and deliver the order. The order to the opposing train is completed and the train starts to execute the order. Nothing is heard of either train for some time. The despatcher has just about come to the conclusion that the engine has broken down when he is called by an office where there is no night operator located between the two stations where order was put out, and informed by the operator he has been called by one of the trains' crew to send accident report. The two trains have met, a head on collision occurred, caused by the sleepy operator not knowing the train passed. . . . Cases are numerous where operators have stated positively that trains had not passed when they were already by. This particular element of danger can be eliminated by having the normal position of train-order signal at danger and requiring every engineer to whistle for it upon approaching it. Unless he sees the signal go from danger to safety he should be governed precisely as though it was at danger and report to the Superintendent each case when he is stopped improperly. It is, of course, incumbent upon despatchers not to issue orders in case they have reason to think that operators are mistaken about trains, but delays to freight trains are frequent and if telegraph offices are far apart they must depend largely on what the operators report. The only arguments I have heard advanced in favor of the safety position of train order signals are, first, they do not occasion so much whistling, and, second, as the number of trains receiving orders at each station is much less than those that do not the operator is liable to get in the habit of putting signal at safety without stopping to think whether he has orders or not.

When a despatcher comes on duty he is given a transfer by the man whom he relieves. This consists of a statement in writing, usually in the train order-book, showing the numbers of the orders in effect, together with any information necessary for the despatcher beginning work. This transfer is carefully perused, the orders referred to read over, and when fully understood the despatcher is ready for business. If there are many trains on the road the idle minutes are few, as when he is not reading orders and checking their repetition, there is a constant stream of train reports being sent in from the various stations to be entered on the train sheet. Operators report trains as soon as possible after their departure, prefacing their reports with the letters "O. S.," which means "on sheet," then their office call, number of train, and if a registering station, name of conductor, engineer, number of engine, number of cars loaded and empty. If it is a heavy despatching division the despatcher sometimes has an operator to assist him known as a copyer. The copyer writes the order in the order book as the despatcher sends it and underlines each word as the operator repeats it back. He also gives "O. K." and complete when authorized by the despatcher and takes the train reports.

The practice of giving trains in one direction absolute right of track is not universal. The N. Y., N. H. & H. rules provide positive meeting points for trains of the same class and each train waits indefinitely for the opposing train, unless orders are given to the contrary. This plan has worked very satisfactorily, but the busiest divisions of this road are double or four-tracked, while its single-track lines do not have a heavy business.

The standard code rules are in use practically on all railroads and safeguards have been added wherever there appeared to be a loophole that would cause trouble. There is not much chance of a despatcher causing collision if he understands his business, and we have had very few reports late years of his getting trains together. He must be careful, of course, in handling extras, for if he has them going both ways at the same time there will be trouble if he does not fix a meeting point; and he must not run an extra over the working limits of a work extra on single track without some provision for getting by the work train. It also happens on double track occasionally that for one reason or another but one track can be used and he has to run trains in both directions over this single track. Considerable care has to be exercised in such cases, but to the despatcher who is competent there is nothing harrowing nor particularly nerve-trying about his work. Many people who have read newspaper and magazine articles on this subject have the impression that a despatcher is under great mental strain; and some writers who have more imagination than real knowledge of the facts picture him as an absolute monarch with power of life and death at his command. This is such rank nonsense that it is hardly worth noticing. . . . There is a fascination about train despatching which, to a man interested in his work, amounts to a positive pleasure.

The brightest and most attentive operators are selected for despatchers, and there is rarely favoritism displayed. There is an operator out on the line perhaps a hundred miles from headquarters. He is very attentive to his work, answers his call promptly and, to the best of his ability, carries out the wishes of the despatcher. When there is a vacancy in the office for an operator this man is remembered and he is transferred to the despatcher's office, usually as night operator. If he has ability he goes forward and in a few years is a despatcher. My experience has been that there is no class of men more loyal to the railroad company and their immediate superiors than despatchers. They are anxious that their

*Extracts from a paper by Mr. C. N. Woodward, Superintendent of the Midland Division of the New York, New Haven & Hartford, read before the New England Railroad Club at its October meeting.

division should make a good showing, both in train movements and in cars handled. If a division falls behind in cars per train there is apt to be a decided remonstrance from the General Superintendent and I do not believe that the Superintendent feels the criticism any more keenly than the despatchers.

There has been more or less discussion lately concerning the feasibility of despatching by telephone. There is a railroad terminating in this city that has for several years used the telephone exclusively for handling trains, the Boston, Revere Beach & Lynn. Superintendent Fenno informs me that his system has given eminent satisfaction. The Illinois Central also uses the telephone for the same purpose on the Omaha & Bridge Terminal Division, and also at the New Orleans Terminal where they have heavy business over about two miles of single track. These are the only places that I have heard of where telephone is used exclusively for despatching. Mr. G. A. Clark, Superintendent of the Omaha Division of the Illinois Central, says that he has used telephones (exclusively) for over a year. He has a "long distance" metallic circuit, with 19 offices. He says: "As far as possible the wording of train orders conforms to the standard code adopted by the American Railway Association. Train order blanks are not made of tissue paper, but are printed on firm colored paper, there being as many colored blanks as there are different forms of train orders, and as much of the form as it is practical to print is placed upon the blanks, the object being to reduce the writing by the person receiving the order to the minimum.

"All conductors, enginemen, yardmasters and yard foremen are examined upon the rules and the different forms of train orders. They are also given special instructions upon the proper use of the telephone. Where we have clerks, certain clerks are designated to handle the train orders. At other points the conductor, yardmaster or the person who executes the order is required to receive it. When an order is transmitted from the train despatcher's office, it is immediately repeated back by the person receiving it, whereupon the despatcher gives his "O. K." time and initials. The train despatcher records the order in a book provided for that purpose.

"There has been no accident, error or misunderstanding. In several respects I consider the service far more efficient than that of the telegraph. We hold our train and enginemen responsible for all delays. A telephone is always within their reach, and therefore there is no excuse if they do not procure assistance on delayed trains. With the telegraph this is not the case. Train and enginemen, not being operators, do not act as promptly through the medium of a telegraph operator as they do when they know that they can communicate with the train despatcher's office.

"From my experience with the telephone in handling trains, I am confident that it might wholly supplant the use of the telegraph for that purpose on main line districts on many railroads."

In spite of the favorable reports of those using the telephone for despatching I hardly feel that I should care to recommend its exclusive use for that purpose on the ordinary despatching division at the present time. Anyone who has used the telephone frequently cannot have helped observing the difficulty experienced at times in making numbers understood and this might be a source of trouble.

The Erie Canal.

The announcement that the steam canal boats and their steel consorts, which have been operating between New York and Cleveland, are to be sent to the Philippines to do a general lighterage and inter-island business, is not encouraging to the friends of the Erie Canal, and it brings sharply before the public the question which has got to be decided in the near future.

The public was already aware that the expenditure of the $9,000,000 had made no appreciable difference in canal navigation. A navigable channel is no deeper than its shoalest part. Measured by that standard there is still not over 6 ft. of clear water in the canal and navigation is impeded by the eel grass. Boats which must not draw over 6 ft. of water cannot compete with the railroads; and it is very doubtful whether a canal giving 2 ft. more water would be any decided improvement.

The depth of water is not the only problem. Two others must be solved to make the canal of any real importance; there must be terminal facilities in New York, including storage facilities, and these things, like the deepening of the canal, cost a great deal of money. There must also be a control of navigation by some concern that can give a through bill of lading from the Northwest to a European port. The business of picking up a cargo in Buffalo and delivering it in New York is as far behind the times as a country peddler is behind a department store. Minneapolis mills are not going to ship flour to Buffalo and then depend upon finding a boat to carry the flour the rest of its journey to the sea. The grain and flour business is being increasingly done in through transactions between Chicago or Duluth and Liverpool or Antwerp. That sort of business does not leave a great deal of money in New York, and this fact has a very direct bearing upon the real value of a canal and the amount that is worth spending on it. In its present condition, and even in the condition in which it would be if the plans of 1894 were completed, the value of the canal is of the least, and the value of the grain trade to this port is steadily declining.—*Journal of Commerce* (New York).

Trains In and Out of Chicago.

In the October number of the *Journal* of the Western Society of Engineers appears a paper on the matter of a central terminal station, in Chicago, concerning which we have said a word in the editorial columns. In this paper the following table appears which will doubtless be of interest to many of our readers. It shows the number of trains arriving at and departing from the various railroad stations in the city of Chicago and is said to be correct as of September, 1900.

TRAINS IN AND OUT OF CHICAGO STATIONS.

		Local and Through Trains.		Suburban Trains.		Total Trains.	Total Suburban Trains.
		Ar.	Dep.	Ar.	Dep.		
Wells St.	Chicago & North Western	18	20	103	108	249	211
Union	Chicago, Burlington & Quincy	12	12	38	39	101	...
"	Chicago, Milwaukee & St. Paul	10	12	30	28	80	...
"	Pittsburgh, Chicago, Cincinnati & St. Louis	5	5	...	...	10	...
"	Chicago & Alton	6	6	4	4	20	...
"	Pittsburgh, Fort Wayne & Chicago	7	7	5	5	24	153
Dearborn	Chicago, Indianapolis & Louisville	5	5	...	...	10	...
"	Chicago & Erie	4	4	...	...	8	...
"	Wabash	8	8	7	7	30	...
"	Chicago & East. Illinois	5	5	12	13	35	...
"	Chicago & Grand Trunk	4	4	5	5	18	...
"	Atchison, Topeka & Santa Fe	5	5	1	2	13	52
Central	Illinois Central	12	13	110	110	245	...
"	Big Four	3	3	...	...	6	...
"	Wisconsin Central	5	5	...	...	10	...
"	Michigan Central	12	11	...	...	23	220
Gr. Cent.	Chicago Terminal Transfer	...	...	7	7	14	...
"	Chicago Great Western	3	3	3	3	12	...
"	Baltimore & Ohio	4	4	...	...	8	20
R. Island	Chicago, Rock Island & Pacific	8	9	30	30	77	...
"	New York, Chicago & St. Louis	3	3	...	...	6	...
"	Lake Shore & Michigan Southern	8	7	14	14	43	88
		147	151	369	375	1,042	744

TECHNICAL.

Manufacturing and Business.

The Allison Mfg. Co., of Philadelphia, Pa., has appointed A. M. Castle, 54-60 South Canal street, Chicago, its Western Representative.

E. B. Colket, of Philadelphia, has been assigned to duty in the Chicago office of the Standard Steel Works and the Baldwin Locomotive Works. Mr. Colket has for some years been engaged in the Philadelphia office of the Baldwin Locomotive Works.

The Pullman Company has just finished and delivered to the Louisville & Nashville three dining cars equipped with the axle light system of the Consolidated Railway Electric Lighting & Equipment Co. No auxiliary light has been provided. One of these cars will run between Cincinnati and Louisville and two between Birmingham and New Orleans.

Work is rapidly progressing upon the foundations for the new plant of the B. F. Sturtevant Co., at Hyde Park, Mass. The buildings, including storage space between, will occupy a tract measuring about 500 ft. x 700 ft. This will provide space for the foundry, pattern and pattern storage building and power plant as well as the machine shop, 120 ft. x 500 ft., and a three-story structure of the same length, both terminating in a large head house which will serve for the work of erecting, testing and shipping. The office will be a separate building of considerable dimensions.

The Alexander Car Replacer Mfg. Co., Scranton, Pa., informs us that some recent sales have brought its total sales to date of 26,000 pairs of car replacers.

Iron and Steel.

The Baltimore & Ohio is said to have placed its order for 50,000 tons of rails.

The Great Northern Ry. of Canada (See Railroad Construction column) will need 62 miles of 70-lb. rail on the proposed extension.

Nevin McConnell, under whose direction and supervision the works of the Sharon Steel Co. were built, resigned on Nov. 2 as Superintendent of the company. His successor has not been named.

A report says that large works to make passenger and freight cars for British and Colonial markets, but more especially the latter, is contemplated at Cardiff, South Wales. North of England capitalists have the matter in hand and are forming a company.

Pittsburgh despatches announce that the American Tin Plate Co., at Monessen, Pa., will be enlarged at a cost of $550,000. It is reported that 12 mills will be added, making 24 mills in all. It is also said that the plant at Canal Dover, Ohio, consisting of six mills, and the plant at Cambridge, Ohio, of the same size, will be dismantled and moved to Monessen.

The Portland Bridge & Building Co., of Portland, Ore., has the contract for all the concrete and steel work on the Portland & Oregon Ry., which consists of nine concrete arch culverts and two steel bridges, one across Lewis River, 825 ft., and one across Solomon Creek, 150 ft.

The Shearman blast furnace at Sharpsville, Pa., owned by the Shearman Iron Co., has been sold to the Shenango Iron Co., of Pittsburgh, which owns the Shenango furnace at Sharpsville.

J. R. Howgate, Superintendent of the Manchester Works of the American Locomotive Co., in Manchester, N. H., has gone to the Schenectady Works as Assistant Superintendent. Mr. Howgate's return to Schenectady does not effect any change in the offices at those works. J. B. Henney succeeds Mr. Howgate at Manchester.

The new blooming mill and rail mill being installed at the South Side plant of Jones & Laughlins, Ltd., will be ready for operation by July 1, next year.

Major T. L. Harper, District Superintendent of the Steel Hoop plants of the United States Steel Corporation, and located in Pittsburgh, has resigned, his resignation having taken effect Nov. 2.

The large steel plant building at Sault Ste. Marie, Ont., by the Algoma Steel Co., owned by the Consolidated Lake Superior Co., is nearing completion and will be in operation soon. It will have a capacity of about 1,000 tons of steel a day and the company will receive a bounty of $3 per ton from the Dominion Government, in addition to a steel bounty on each ton of pig iron made from Canadian ore. By next May it is expected to have the 450-ton blast furnaces finished. The entire plant will represent an outlay of $10,000,000.

To Make Rolled Steel Car Wheels.

Chas. T. Schoen, Chairman of the Pressed Steel Car Co., and Second Vice-President E. A. Schoen, have resigned and will hereafter, it is said, devote their time to the new $5,000,000 company which Mr. C. M. Schwab and others have organized to make rolled steel wheels.

Westinghouse Electric Factory for Russia.

The directors of the Westinghouse Electric & Mfg. Co., at a meeting held, Oct. 24, declared the usual quarterly dividend of 1¾ per cent. on the assenting stock. The rumor that the company proposes to start a plant in Russia was to-day officially confirmed. Property has been purchased adjoining the plant of the Westinghouse Air Brake Co.

The Electro Magnetic Brake Company.

A company is to be formed to make and sell the Westinghouse electro-magnetic brake, which we described in considerable detail not long ago. The incorporators named are H. H. Westinghouse, W. W. Ward, E. M. Herr and John Caldwell, whose names, of course, are very familiar to our readers.

British Westinghouse Electric Manufacturing Co.

The British Westinghouse Electric & Mfg. Co., Ltd., has contracted for some of the equipment of its extensive works now building at Manchester. The Lodge & Shipley Machine Tool Co. will furnish nearly 100 lathes. Sixty milling machines have been ordered from the Cincinnati Milling Machine Co., and the G. A. Gray Planer Co., has a contract for a number of its specialties. These contracts aggregate nearly $500,000. John Hethington & Sons, Ltd., of Manchester, will supply a large horizontal boring mill, with dividing tables measuring 10 ft. 7 in. to 4 ft., uprights 12 ft. high, with a 9 ft base. The machine will be built from patterns furnished by the British Westinghouse Co. The Bullard Machine Tool Co., of Bridgeport, Conn., has a $175,000 contract for various large machine tools.

Master Car Builders' Standards.

As a result of the last letter ballot new lithographs have been prepared showing the changes in Standards and Recommended Practice. The size of these lithographs is 30 x 38 in., and they are of such quality that blue prints can be taken from them. A full set consists of 30 sheets, 21 devoted to Standards and nine to Recommended Practice. They are ready for distribution and are sold at $7.50 per set, or 25 cents per sheeet. A pamphlet containing the text of Standards and Recommended Practice and reduced illustrations is ready for delivery, and is sold at 25 cents per copy.

The Rules for Loading Long Materials, revised as a result of letter ballot, are ready for delivery. They are in pamphlet form and are sold at the same rates as the Rules of Interchange.

The Air-Brake and Signal Instructions were modified in one or two instances, and these instructions, as revised, are ready for distribution. They are sold at the same rates as the Rules of Interchange and Rules for Loading Long Materials.

The Report of Proceedings has been distributed, and can be had at $1.50 per copy. All of the above literature may be had from the office of Mr. Jos. W. Taylor, Secretary, The Rookery, Chicago.

An Oil Burning Pumping Plant.

The unusually dry seasons which Southern California recently had, caused greater demand for improved pumping machinery and a typical plant was lately installed at Pomona. There are two boilers of 100 h.p. each, driving air-compressors so located that steam connections may readily be broken and electric or other power substituted. There are 16 wells that deliver a total of 3,250,000 gals. in 24 hours, and the water is raised from the wells by air-lift. The air pressure carried is from 45 to 55 lbs. per sq. in. and a pressure governor gives relief in case of clogging of the pipes and undue rise of pressure. The air is led from the compressors to the wells in sheet steel pipe, of which there is more than a mile-and-a-half, gradually reduced in diameter according to the number of wells served from the main line. The exhaust from the compressors is condensed into a hot well and fed to the boilers through a reheater in the stack. The boilers are fired with oil through a Hamill burner and there is a cement oil tank holding 299 bbls. of fuel oil, from which the fuel supply is drawn.

Air-Brake Cars at Nashville.

Air-brake cars cut out coming into Nashville Yard, Nashville, Chattanooga & St. Louis Railway, September, 1901.

Blowing at exhaust	47
Blowing at vent port	18
Triple valve needed cleaning	47
Vent valve piston stopped up	3
Triple piston packing ring worn out or broken	13
Triple valve gasket blown out	11
Check valve case gasket blown out	16
Works emergency, service application	5
Sand hole in triple valve body	1
Slide valve applied wrong	2
Release valve leaking	17
Reservoir stud broken	1
Brake cylinder gasket blown out	1
Brake cylinder packing leather worn out	7
Brake cylinder bolt broken	1
Unions leaking	37
Angle cock leaking	3
Angle cock and hose gone	1
Train pipe broken	7
Branch pipe broken	11
Flat wheels	24
Brake rigging out of order	30
Total	303
Cars leaving Nashville with brakes cut out	89
Cars repaired	214

Air-brake cars cut out leaving Nashville Yard, September, 1901.

Number of air-brake cars forwarded	8,091
Number of air-brake cars O. K.	8,002
Air-brake cars cut out	89
Average serviceable air-brake cars per train	16.8
Of the 89 cars cut out, there were:	
Blowing at vent port	10
Check valve case gasket blown out	3
Triple valve gasket blown out	2
Sand hole in triple valve body	1
Triple valve piston packing ring worn out	2
Release valve leaking	5
Reservoir stud broken	2
Broken bolts, non-pressure head	1
Brake cylinder gasket blown out	1
Brake cylinder packing leather worn out	1
Train pipe broken	3
Branch pipe missing	1
Branch pipe broken	6
Angle cock leaking	1
Flat wheels	19
Brake rigging out of order	16
Total	89

Of the 89 cars cut out, 56 belonged to railway companies, 33 to private car lines. Of the air-brake cars forwarded, 6,839 were equipped with apparatus of the Westinghouse Air Brake Co., 1,243 with apparatus of the New York Air Brake Co., 4 with apparatus of the Landsberger Air Brake, 4 with apparatus of the Boyden Air Brake, 1 with apparatus of the Crane Air Brake.

New York Rapid Transit.

At a meeting held last week of the Commissioners appointed to consider the Brooklyn extension of the Rapid Transit Railroad, in answer to a question regarding speed, it was asserted that the trains could easily make 40 miles an hour, and the time from City Hall, Manhattan, to the terminus at Flatbush and Atlantic avenues, about 5¾ miles, would be cut down from 34 minutes to seven or eight minutes.

Mr. Orr, President of the Commission, described the conditions before the Commission, how it had to adopt a route that would be sufficiently attractive to produce a bidder for the contract. He also described the terms and conditions of the proposed contract.

Southern Car & Foundry Co.

Additions are being made to the rolling mill of the Southern Car & Foundry Co., at Anniston, Ala., by putting in 10 new puddling furnaces. The company is also making additions to its bar mill, enabling them to roll angles and channel bars up to 12 inches. The repairs at the Gadsden plant will be finished within a few days and the company expects to begin building cars soon afterward. When this plant starts all of the plants, including Memphis, Lenoir City, Anniston and Gadsden, will be running on full time.

A Canadian Portland Cement Plant.

The National Portland Cement Company, Limited, recently organized with American and Canadian capital, to build a Portland cement plant in Toronto, Ont., is about to place contracts in the United States for the complete equipment of its projected plant. The initial capacity of the factory will be 1,000 barrels per day, but provision is made to double the output. The works will cost nearly $250,000. The plant will be operated by electricity. W. F. Cowham, managing director of the Peninsula Portland Cement Co., of Jackson, Mich., is president of the National Company. The Canadians interested are A. T. MacLaren, P. W. Stanhope, of the McCormick Harvesting Machine Co., and Gilbert McKechnie, of Durham, Ont. The company's offices are in the James Building, King and Yonge streets, Toronto. The capital is $1,500,000.

Automatic Block Signals.

The Pittsburgh & Lake Erie has given to the Union Switch & Signal Company, of Pittsburgh, a contract for equipping the road with block signals from Youngstown, Ohio, 68 miles north of Pittsburgh, to Glassport, Pa., 18 miles south of Pittsburgh, or a total distance of 86 miles. Semaphores worked by electric motors will be used, a home and a distant signal at the entrance of each block section. The block sections for about 20 miles near Pittsburgh will be about 2,000 ft. long; on other parts of the road, 4,000 ft. Current for the electric motors will be supplied by storage batteries placed at the foot of each signal post.

The North Eastern Railway, of England, is to put up an experimental installation of Hall automatic block signals on its main line near York.

THE SCRAP HEAP.

Notes.

Chicago papers state that the Chicago & North Western has promised its trainmen a material increase of pay.

At Manitowoc, Wis., on the night of Nov. 3, 96 carloads of flour on the tracks of the Wisconsin Central were destroyed by fire, together with a freight house and other buildings. Loss, $125,000.

The enginemen and firemen of the New York Central will hereafter receive overtime on trips which take more than 10 hours, the limit being reduced from 12 hours to 10.

On the Chicago & Alton conductors and brakemen are now required to have their eyes tested for color perception and vision. Heretofore this test has been required only of enginemen and firemen.

On the repeal of the special charter of the Michigan Central Railroad, in the State of Michigan, which takes effect Jan. 1, 1902, that company will have to carry passengers in that State for 2 cents a mile, and the passenger association of the State is re-adjusting the rates in the State to meet the new conditions.

Chicago papers say that the proposition to establish a pension department for superannuated employees, which had been under consideration by the directors of the Chicago, Milwaukee & St. Paul, and which, it was said, would be adopted, has been given up; and it is reported that probably a relief department will be established.

The Railroad Commissioners of Massachusetts, acting on a complaint made by passengers, have issued an opinion to the effect that the fare on the Plymouth Division of the New York, New Haven & Hartford, between Boston and Bird street, 2.8 miles, should not be over 5 cents. The same decision applies also to Dudley street, 2.4 miles. The fare at present is 7 cents to Dudley street and 6 cents to Bird street.

The "car famine" is now well-nigh universal. Although facilities have been greatly increased the nation's business has expanded more rapidly. Car shortage is spoken of by the commercial reviewers as the chief retarding influence in preventing further expansion of business. From all sections of the country and many lines of industry complaints are heard regarding the inability to move goods. Probably the delay has been most aggravating in the case of coal. Not only are steel mills many months behind orders and prompt deliveries commanding premiums, but even where goods are ready for customers it is often impossible to ship because of lack of cars. Iron ore would move freely by water if it could be transported from docks to furnaces; pig iron is wanted much faster than it can be handled and fuel is in a similar predicament.

The Unconquerable Scalper.

A ticket scalper in Louisiana has struck upon a new wrinkle which has fairly taken away the breath of the Southern Pacific passenger men. Colonel S. F. B. Morse, passenger traffic manager, has a sample of the workings of that genius, which he states eclipses anything in the scalping line he has ever seen.

"I have 4,000 mutilated, rewritten, repunched tickets on which scalpers have worked all sorts of curious schemes to outwit the conductors, but of all that number there is not one but which would pale into insignificance compared with this piece of work."

Mr. Morse had on his desk an ordinary appearing ticket, a half yard in length, which had been sold to a woman at Jennings, La., for $18. It was to carry her to Chicago and return, but by the merest chance the conductor to whom it was presented got on to the fact that the ticket was not genuine and put the lady off. He did not observe anything wrong about the ticket itself, but the lady's manner when she went to sign it excited his suspicion. She hesitatingly wrote a name which was different from the one on a grip by her side. She did not deny having purchased the ticket of a scalper when accused of such, and, of course, the conductor had nothing to do but refuse to carry her on it. The Southern Pacific has a special paper, so made that the least touch of acid upon it will instantly make a yellow spot. This paper is dark pink color, and any touch of acid, such as is used in erasing ink, makes a spot that is very perceptible.

"Now this scalper did not do a thing but give the whole ticket an acid bath, turning the whole thing yellow, and at the same time washing off all of the writing on it. He then practically had a new ticket, and all he had to do was to fill it out as desired. The conductor did not notice the change in color, as he handles tickets of all colors from other roads. It is the shrewdest piece of work of the kind I have seen."

Mr. Morse is making a bitter fight on scalpers in Texas. The recent injunction cases at San Antonio, out of which resulted the arrest of two scalpers yesterday, was due to his having refused low rates for the fair until he was given assurance that the scalpers would not be permitted to mutilate and traffic in Southern Pacific tickets. The fair board got out the injunction.—*Galveston News.*

The Metropolitan and the New York City Election.

Mr. Vreeland, speaking at the first monthly meeting of the Association of Metropolitan Street Railway Employes, said:

"For a little over eight years I have been connected with the Metropolitan Street Railway Company. For five years I have appeared on this or the other platforms of this association on nearly every meeting night and talked to the men assembled. There has never been any question brought to the attention of the association save its own affairs. Now, with the other troubles that we have as railroad men, we have another trouble.

"For eight years there has been absolutely no politics in the operation of the Metropolitan Street Railway system. You have not had to depend on any political leader to secure a position, you have not had to depend on any political leader to keep a position. Your work, your record, the character of service rendered by you has been the only thing entering into the question of your employment. For the time that I have been connected with this property no man connected with the property, irrespective of his position, can honestly say that until now I have ever discussed politics in any shape whatever.

"After eight years of efforts to keep politics out of the Metropolitan Street Railway system, we have been picked up by the back of the neck, thrown into the political issue and attacked as a body. Men who know better, who knew they were telling falsehoods, have stood up before you and the other citizens of New York and said that this company was in politics, that it was endeavoring to coerce and influence its employes as to what should be the exercise of their right under the voting franchise. No man has ever been or ever will be asked or held responsible for the exercising of his rights politically while I am president of this company, while I know it. I felt it was due myself as president of this company and to you as employes of this company, to say to-night that the assertion that you and I were acting as receivers of stolen goods, administering properties which were stolen from the public, was a base lie. There is not a franchise that the Metropolitan Street Railway Company has gotten since its organization or owns to-day but what was bought in the open market and bought in at a price, and any set of men had a right to go there and make a bid for it. It is false when any one says that this company has never paid the highest market price for any property which it controls."

The Energy in the World's Coal.

The total quantity of coal taken in any given year from the mines of the whole world cannot be very accurately ascertained, but from the best available information it may be assumed to have been about 700,000,000 tons of 2,000 lbs. each for the year 1900, the last of the nineteenth century. Assuming that the combustion of 1 lb. of coal produces available energy equal to the work of one horse for one hour, and that a horse-power is equal to the power of seven men, it is found that this represents in energy the equivalent of 9,800,000,000,000 hours of work for one man, and allowing 10 hours to each day and 300 working days to the year, this is found to be equal to the work of 3,000 millions of men during one year. This is about double the entire population of the globe, and it follows that the utilization of the energy of combustion is equivalent to an increase of the working capacity of this population to the extent of an addition of two able-bodied men for every man, woman, and child; and practically it amounts to much more than this, for these additional 3,000 million stalwart laborers make no demands upon the food products of the world: they need no clothing, no matter what the zone of their employment, and in faithfulness, loyalty, general docility and ease of management they are beyond compare.—*Cassier's.*

Abolition of 200 Grade Crossings in Massachusetts.

The work of abolishing the railroad crossings at grade in towns and cities of Massachusetts is now almost ended—for the present. The matter will almost certainly come up before the Legislature, next year. Meanwhile the fund set apart by that body for meeting the expenses of the work has been exhausted. It is generally believed that the State will not refuse to continue the work, but there is some question whether the law, as regards the proportion of payment to be made by the State, will remain unaltered.

Since 1890, when the present law was adopted, the amount actually spent by the State has been decidedly above the $5,000,000 originally contemplated. . . . It seems to be quite widely inferred that the grade crossings are pretty generally abolished; but of the 2,200 grade crossings in Massachusetts in 1890, only about 10 per cent. have been abolished. And the $5,000,000 is all gone. Plainly, if the State is going to bear so large a proportion of the expense, the State debt is going to be increased tremendously.—*Boston Advertiser.*

More Good Roads.

A Southern exchange says: "In view of the praiseworthy enterprise of the Southern Railway Company in sending a special train through the South to teach the Southerners the art of roadmaking, it is interesting to note that the almost roadless county of Lowndes will soon have a few miles of passable road. The Louisville & Nashville, never tired in well doing, has given to Lowndes county enough chert to build a good road from Letohatchie station to Hayneville, the historic county seat, a distance of some seven or nine miles. The Louisville & Nashville agrees to deliver the chert at Letohatchie free of charge on the condition that the chert shall be used solely on the Letohatchie-Hayneville road. The value of the gift is $25,000, and the citizens of Lowndes are under many obligations for this splendid present and should and do highly appreciate it. There are 600 carloads in all, enough chert to cover the road 10 in. deep in the center to 7 in. deep on each side."

American Coal in France.

The U. S. Consul at Marseilles writes: "I am happy to report the continued and notable success of American coal in this market. The arrivals of English and American coals at this port during the *first six months* of the current year and the year previous are as follows:

	1901. Tons.	1900. Tons.
English coal	389 303	457.752
American coal	97.622	7 739

The total receipts for the year 1900 were 856,638 tons from Great Britain and 118,491 tons from the United States. Steadily increasing shipments are being made from American ports, and the probabilities are that the total receipts at Marseilles during the present year will exceed 200,000 tons. The business may be said to have passed the experimental stage, and the discussion of terms and conditions is no longer necessary. In face of the very notable decline in freight rates from Cardiff, American coal has succeeded not only in holding its own, but in increasing in local importance, thus tending to disprove the idea that its sale could be undertaken only

during the prevalence of abnormal conditions in Great Britain.

Montreal as an Export City.

A new scheme is proposed for rendering the navigation of the St. Lawrence safe. The maritime interests of the river have been seriously threatened of late. The disasters on the route have increased, the insurance rates have been advanced, rates to Montreal have been made higher than to Quebec, and the Montreal agent of a leading steamship line has notified the Government that unless insurance rates can be modified his line will have to withdraw. Very serious apprehensions have been felt in Canada that all the ocean steamship lines would desert the river. At this critical juncture a patriotic Canadian has invented an apparatus for rendering the navigation of the river perfectly safe. Instead of lighthouses, buoys and beacons, he proposes to lay an electric cable in the middle of navigable channels and therewith to provide colored lights at or about the water level, on floats, using different colors for the two sides of the channel.—*New York Journal of Commerce.*

Russian Railroads.

According to German newspapers, the Russian railroad-building commission has just approved the plans for the Moscow-Kasan-Kyschtymsk Railroad. The present outlet of the Trans-Siberian Railroad—the Ssamara-Slatonster Railroad—is so overburdened with freight that it can no longer handle the goods delivered. It has become necessary to find other means to relieve trans-Siberian traffic, and the so-called North Railroad, which connects Viatka, via Vologda, with St. Petersburg, and the Moscow-Kasan-Kyschtymsk line, which has been projected by the Moscow-Kasan Railroad, will be made to serve the purpose. The former line is already laid out and contracts are being made with foreign firms for its construction. The building, equipping, and running of the latter road has been turned over to the Moscow-Kasan Railroad Company by the commission, under condition that it be completed at once and that the necessary rails and cars be ordered from Russian factories. Another new line is to unite the cities of Poltava and Yekaterinoslav. This road will be 66 miles long. The concession is for 81 years, but after 20 years the Government is to have the right to buy the road for a stipulated price.

Power from Terrestrial Heat.

The stored energy of the heat of the earth's interior is beyond power of calculation. From a short distance below the surface the temperature increases downwards at an average rate which indicates that at a depth of 50 miles it is not less than 5,000 deg. F., and there is abundant reason for believing that the earth is an intensely hot body with only a thin layer of poorly conducting, cold surface matter. These are the essential conditions of a heat engine of enormous capacity, and as in many parts of the world comparatively high temperatures are found very near the surface, while in all parts considerable ranges are possible within reasonable differences of level, the interior heat of the earth, which has an origin more remote in time than the sun, or its own axial rotation, is worthy of most serious consideration as a possible and reasonable source of power. Its importance will be greatly enhanced when we are able to transform heat energy directly into electricity on a large scale and with economy, avoiding the great waste which necessarily accompanies the use of the steam engine; and this must soon come about.—*T. C. Mendenhall, in Cassier's.*

The Cramp Steel Co.'s Plant.

The iron and steel works building by the Cramp Steel Co. of Ontario, Limited, at Collingwood, Ontario, are so far advanced that it is expected steel will be made before the opening of the navigation season in 1902. The plant will include two Bessemer convertors of 7-ton capacity each. The capacity of this plant will be 600 tons per day, which tonnage can be increased to 800. Adjoining this Bessemer plant will be the open hearth furnaces. This building will contain two 20-ton open-hearth furnaces. This portion of the plant is so arranged that the number of open-hearth furnaces can be increased without interfering with the rest of the plant. Adjoining this building is the gas-producer building. Next come the blooming train and the merchant bar and rod mill. The pit house adjoins the blooming train plant and is a stone building 70 ft. by 50 ft. The merchant bar and rod mill is a stone building 190 by 70 ft., and contains two trains of rolls. The company will probably get its pig iron partly from the Sault Ste. Marie and Midland furnaces, and partly from United States sources. It will later build furnaces of its own to handle Canadian ores.

New Dry Dock for the Brooklyn Navy Yard.

Advertisements will soon be issued by the Navy Department for bids for building dry dock No. 4 at the Brooklyn Navy Yard. The specifications were approved by Admiral Endicott, Chief of the Bureau of Yards and Docks, on Nov. 2. The dimensions of the proposed basin are as follows: Length, 500 ft.; width of bottom, 80 ft.; depth at sill, 31 ft. The sum of $1,200,000 is available for the work. Sixty days will be allowed contractors to prepare and submit bids.

Bids are wanted, Nov. 30, by the Navy Department for building a store house at the Brooklyn Navy Yard. There is $180,000 available for the building, which will be a 2-story brick and steel structure.

Concession for a Mexican Railroad.

It is authoritatively stated that a concession has been granted to an America syndicate to build a railroad from Monterey to Matamoras, near the mouth of the Rio Grande. The concession carries a government subvention of $8,000 a kilometer, and there is a probability that the State of Tamaulipas will add $2,000 a kilometer. The rich resources of northern Tamaulipas have remained undeveloped. Almost anything suited to a sub-tropical climate will grow in this section.

Abolition of Toll Gate in Tennessee.

According to the *News*, of Nashville, Tenn., Davidson County, that state, the center of which is Nashville, is soon to make a decided improvement in the freedom of travel by abolishing toll gates on 157 miles of turnpike where now about $57,000 is collected annually. The roads in question radiate from Nashville in every direction; they are the Charlotte, Dickerson, Gallatin, Lebanon, Murfreesboro, Hardin, Hyde's Ferry, Nolensville, White's Creek, Brich church and Hillsboro roads. Owners of one road, the Franklin, thus far refuse the offer of the county authorities to buy them out. All of the others, it is said, have practically agreed to sell their rights and deliver the roads to the county on January 1. This action of the country authorities has been taken under a law passed this year authorizing the sale of $250,000 worth of bonds for the purpose of buying the roads. One of the provisions of the contracts will be that on roads extending beyond the boundaries of the county no toll gate shall be put up within half a mile of the county line. The estimated cost of maintaining the roads hereafter is about $27,000 yearly, which includes $100 a mile for repairs, $8,750 for interest on bonds, and $3,000 for salaries of superintendent and commissioners. This is less than half the estimated cost to the public heretofore. There will be one commissioner for each turnpike, who will receive $100 a year and must reside on the road to which he is assigned. The superintendent of all the roads is to receive $1,500 a year.

Estimates for New War Ships.

The Naval Board of Construction has prepared a programme of new construction which has been submitted to Secretary Long, which involves an estimated expenditure of more than $35,000,000. It includes four seagoing battleships of about 16,000 tons trial displacement and to have a speed of 18 knots: four armored cruisers of about 14,500 tons trial displacement, to have a speed of 22 knots and a coal carrying capacity of 2,000 tons; 18 gunboats, six to be of 600 tons, six of 1,000 tons and six of 1,500 tons; six picket or despatch boats, to be of 1,000 tons each and a speed of 20 knots. It is possible that a supplemental recommendation will be made for the authorization of a dozen gunboats of 200 or 300 tons displacement, besides some colliers and an engineering repair ship.

Another Destroyer.

The torpedo boat destroyer "Chauncey" was launched on Oct. 26, from the shipyard of Neafie & Levy, at Philadelphia. She is a sister ship of the "Bainbridge," previously launched, and is 245 ft. long, 23 ft. beam, with triple-expansion engines and Thorneycroft boilers, and her speed will be about 29 knots.

Automobiles on the Highways.

An automobile was recently hit at a railroad crossing on Long Island. Concerning this a correspondent of the *New York Herald* writes: "While the grade crossings are very dangerous here, and Westbury is one of the worst, they are not half as dangerous as motors run at the speed they are in Nassau County. It should be remembered that the best evidence is to the effect that M. Fournier was breaking the law in regard to speed, and it is not denied that he and Mr. Vanderbilt were conspiring to break it in trying for a record. M. Fournier's statement that he was running six miles an hour is nonsense, as a train can be seen before it gets within 50 feet of the crossing, and a motor which cannot be stopped in that distance when traveling at six miles an hour is not safe to run anywhere. There seems to be a mistaken impression regarding the object for which the roads of Nassau County were built, they being intended for the use of the taxpayers and residents of the county and not as a race track."

Irrigation and the River and Harbor Bill.

There are indications that the river and harbor bill which Chairman Burton proposes to introduce early in the session of Congress will not have plain sailing. It is likely to encounter a snag that has before this proved disastrous. This is the irrigation idea that has grown to lusty proportions among Western members. For several years past the members of Congress from the semi-arid regions of the West have contended that Government aid in directing water through the desert lands is as germane to river and harbor legislation as its aid in digging deeper channels and harbors to facilitate commerce. Those who realize what a tremendous proposition irrigation is bound to become shrink from making it a feature of public improvements. That a systematic attempt will be made to enlist Congress in the irrigation enterprise is very manifest.

LOCOMOTIVE BUILDING.

The Chicago & Eastern Illinois has ordered five engines from the American Locomotive Co.

The Waynesburg & Washington has ordered one engine from the American Locomotive Co.

The Lexington & Eastern has ordered two engines from the Baldwin Locomotive Works.

The Rio Grande & Western has ordered 40 locomotives from the Baldwin Locomotive Works.

The California & Northwestern has ordered two engines from the American Locomotive Co.

The Colorado Springs & Cripple Creek has ordered two engines from the American Locomotive Co.

The Atchison, Topeka & Santa Fe has ordered one engine from the Baldwin Locomotive Works.

The Pittsburgh & Lake Erie has ordered 15 engines, instead of 12, as stated last week, from the American Locomotive Co.

The New York, New Haven & Hartford has ordered, from the American Locomotive Co., 10 passenger, 10 mogul freight and 10 switching engines.

The Grand Rapids & Indiana, as noted Oct. 25, has ordered seven 10-wheel freight locomotives from the American Locomotive Co., for March delivery. They will weigh 109,700 lbs. on drivers and 139,500 lbs. total, and have 19-in. x 26-in. cylinders; 62-in. driving wheels; straight radial stay boilers with 200 lbs. steam pressure, and 290 tubes 2 in. in diam. and 15 ft. long; steel fireboxes, 200 in. long and 42 in. wide; tender capacity, 5,000 gals. of water and six tons of coal.

CAR BUILDING.

The New York, New Haven & Hartford has ordered 1,000 box and 100 flat cars from the Pressed Steel Car Co. They will be wooden cars with steel underframes.

The Louisville & Nashville expects to add some reclining chair cars to its equipment. It has not been decided whether the cars will be built in the road's shops or built by contract.

The Canadian Pacific is building, at its Perth shops, 1,200 freight cars; and at its Hochelaga shops, 20 first-class passenger coaches, six sleeping cars and two parlor cars. Twenty cabooses are being built at Farnham.

The St. Louis & San Francisco order with the American Car & Foundry Co. calls for 491 coal cars, of 80,000 lbs. capacity, for Dec. 1 delivery. They will measure 34 ft. long and have American Steel Foundry Co.'s bolsters and trucks, Trojan couplers and Scott springs.

The Northern Pacific has ordered 30 passenger cars from the Pullman Co., and 14 from the Barney & Smith Car Co.; also 300 Rodger ballast cars from the Rodger Ballast Car Co. The last named will measure 34 ft. long, be of 80,000 lbs. capacity and equipped with Common Sense bolsters. The contract calls for February delivery.

The Colorado Springs & Cripple Creek District order with the American Car & Foundry Co. for 100 box cars, referred to Oct. 11, calls for cars of 60,000 lbs. capacity, to weigh 33,000 lbs. and to measure 34 ft. long, 9 ft. 9½ in. wide and 12 ft. ½ in. high, for December delivery. The specifications include American cast-steel bolsters, Westinghouse brakes, Tower couplers and McCord journal boxes.

BRIDGE BUILDING.

ARNPRIOR, ONT.—The County Council has decided to build a steel bridge to replace Eganville bridge.

BEREA, OHIO.—The County Commissioners have granted permission to the Cleveland & Southern to build a bridge at this place. The company agrees to repair the old bridge for wagon traffic and build its new bridge beside the old structure.

BRISTOL, TENN.—George E. Boren, of the committee appointed by the County Court to consider rebuilding bridges, tells us that his committee will report at the January term of the court, at which time it is probable that the Court will authorize the building of four bridges. It is possible that they will be suspension bridges. They will cross the Watauga River and the Doe River.

BUFFALO, N. Y.—New bids are wanted, Nov. 11, for the superstructure of a viaduct over the Erie Railroad, in Van Rensselaer street. F. V. E. Bardol, Chief of the Bureau of Engineering.

CEDAR RAPIDS, IOWA.—The following bids were opened Oct. 18, for the A avenue viaduct: American Bridge Co., $34,600 and $37,700; Wm. S. Hewitt & Co., Minneapolis, $35,000 and $37,987; Standard Bridge Co., Omaha, Neb., $36,800 and $39,000; Ford & Snowffer, Cedar Rapids, Iowa, $35,000 and $38,000.

CHICAGO, ILL.—The City Engineer has decided to ask the Council to appropriate $160,000 for a bridge at North Western avenue.

COLUMBUS, OHIO.—The County Commissioners will submit a proposition to vote for new bridges at Hayden's, over the Scioto River, and at the junction of Alum Creek and Big Walnut River. Estimated cost of both, $100,000.

DES MOINES, IOWA.—A local report says that plans for the East Sixth street and Sixth avenue bridges will soon be ready and it is expected that bids will be opened by Dec. 14. Geo. M. King, City Engineer, is supervising the work.

DONORA, PA.—The Union Steel Co., which is building a large independent wire and nail plant at Donora in the Monongahela Valley, will build a four-track bridge across the Monongahela River to reach the Pittsburgh & Lake Erie R. R.

FINDLAY, OHIO.—It is reported that plans have been made for a bridge over Blanchard River for the Lake Erie & Western.

GREENWICH, CONN.—S. E. Minor, Borough Clerk, informs us that nothing definite has been done regarding building a bridge over Mianus River.

KANSAS CITY, KAN.—Reports state that plans and specifications are being made by Tuttle & Pike, of Kansas City, Mo., for a bridge over the Kaw River for the Kansas City & Leavenworth Electric Ry.

KANSAS CITY, MO.—The receivers for the Kansas City Suburban Belt R. R. have authorized nearly $200,000 to be spent for five new steel bridges. The largest will span the Kaw River near the mouth, and will cost about $100,000. The other four bridges will cross the Blue River and its tributaries.

LANSING, MICH.—City Engineer H. A. Collar is making plans and estimates for a new bridge over Grand River on Washington avenue.

MILWAUKEE, WIS.—The Board of Public Works, on Nov. 1, received two bids for the new Broadway street bridge over Milwaukee River. The American Bridge Co. bid $124,000 and Adolph F. Buess, $125,375.

NEW YORK, N. Y.—The Board of Public Improvements is reported considering building a viaduct and bridge over the Harlem River between Morris Heights and Fort George. The approach on the Bronx side will be on Sedgwick avenue, between 177th street and Burnside avenue. Louis A. Risse is Chief Engineer of the Board.

PASADENA, CAL.—A bridge will be built over San Gabriel River at a cost of $10,000, to replace the bridge washed away early in 1890. The new bridge will be 700 ft. long.

PITTSBURGH, PA.—The Pittsburgh, Carnegie & Western (Wabash) has awarded a contract to the American Bridge Co. for the proposed cantilever bridge over the Monongahela River from the foot of Ferry street. The contract price is said to be $700,000.

QUEBEC, QUE.—Chief Engineer A. E. Doucet, of the Great Northern Ry. of Canada, informs us that on the extension mentioned under Railroad Construction, there will be 1,400 ft. of steel viaducts, one span of 200 ft., one span of 660 ft., one span of 125 ft., and three spans of 100 ft., two spans of 50 ft., one span of 30 ft.

SAGINAW, MICH.—H. E. Terry, City Engineer, informs us that the date for receiving bids for the Genesee street bridge over Saginaw River, is Dec. 12 at 7:30 p.m. Each bidder is required to furnish a full set of plans and drawings to show in detail the kind of bridges he intends to build. Further information can be had of the Board of Public Works. Alfred Davies, Clerk of the Board.

SWAMPSCOTT, MASS.—A commission composed of Samuel K. Hamilton, Wakefield; John E. Hamilton, of Cambridge, and Railroad Commissioner Clinton K. White, of Melrose, is appointed to apportion the cost of the new bridge over the tracks of the Boston & Maine at Essex street.

WASHINGTON, D. C.—In the annual report of W. J. Douglas, Engineer of Bridges of the District of Columbia, the following appropriations are asked for the fiscal year ending June 30, 1903: For repair of bridges, $29,000; for borings, surveys, estimates and plans for the new Anacostia bridge, $3,000; for rebuilding K street bridge over Rock Creek, $20,000; for continuing work on Connecticut avenue bridge over Rock Creek, $200,000.

Bids are wanted by Mr. Brown, Chief Engineer of the Pennsylvania R. R., until Nov. 15, for finishing the piers and abutments of the Long Bridge over the Potomac River, as stated in our advertising columns.

WATERVILLE, OHIO.—The Toledo, Waterville & Southern will build a bridge over the Maumee on the extended abutments of the county bridge.

WESTMORELAND, KAN.—Bids are wanted, Nov. 9, for a steel bridge over Cross Creek. Address A. P. Scritchfield.

WILKESBARRE, PA.—The Grand Jury, on Nov. 2, recommended 32 bridges in various boroughs of the county, ranging in cost from about $250 to about $1,200. The appropriation is $15,000.

Other Structures.

AUSTIN, TEXAS.—The Houston & Texas Central will begin work on a new passenger depot here.

BUFFALO, N. Y.—The American Radiator Co. will build a new plant at Hertle avenue and Tonawanda street.

BUTTE, MONT.—The Northern Pacific, according to report, will soon build a new passenger station here.

CHARLESTON, S. C.—The report of the Naval Board appointed to make plans for the new naval station at Charleston gives in detail all the improvements proposed. Besides mentioning the buildings, it suggests that Cooper River be dredged to a depth of 32 ft., and that the dredged material be deposited so as to raise the grade of the water front 6 ft. above high water. A site is located for two dry docks.

ENSLEY, ALA.—The Garrett & Cromwell Mfg. Co., of Cleveland, Ohio, it is said, will make the plans and specifications for the plate mill which the Tennessee Coal, Iron & R. R. Co. will build at Ensley, at a cost of about $250,000.

NEW BERLIN, CONN.—The Berlin Construction Co. will build a bridge shop opposite the power station in Berlin. The new plant will be 90 x 240 ft. There will be several auxiliary buildings.

NEW LONDON, CONN.—The Central Vermont Ry., we are told, is considering building a grain elevator at New London, but as yet no plans have been formulated.

NEWPORT NEWS, VA.—General Superintendent Post, of the Newport News Ship Building & Dry Dock Co., tells us that there are some small improvements expected to be made at the plant, but no extensive improvements are contemplated in the immediate future, as currently reported.

PATERSON, N. J.—The Jersey, Hoboken & Paterson St. Ry. has let a contract for a large car house and repair shop in Paterson, which will cost $100,000.

PORTAGE LA PRAIRIE, MANITOBA.—The Canadian Pacific, according to report, will establish carpenter and car repair shops here before the end of the year.

PROVIDENCE, R. I.—The Providence Dock & Warehouse Co. proposes to build extensive docks at Providence.

The Brown & Sharpe Mfg. Co., makers of machinery and tools, are building foundations for a new foundry, but have not decided when the building proper will be begun as the plans for the superstructure are not finished.

RICHMOND, VA.—The Chesapeake & Ohio will build a machine and repair shop in connection with their new roundhouse at Orleans street in Fulton. Contract will be let shortly. The new yard at this place was described in the *Railroad Gazette*, Oct. 11, page 703.

SAN FRANCISCO, CAL.—The repair shops of the Santa Fe, at Port Richmond, containing considerable machinery, were destroyed by fire Nov. 1, causing a loss of about $125,000.

SHEBOYGAN, WIS.—The report published last week that the Chicago & North Western would establish shops in Sheboygan, is erroneous.

SPRINGFIELD, MASS.—The Wason Mfg. Co., of Brightwood, according to report, has decided to build a large addition to its plant to be used as a car erecting shop. It will be one story high, 75 x 125 ft. It is said bids will be wanted at noon on Nov. 9.

WASHINGTON, D. C.—The Commissioners of the District of Columbia are in favor of the proposition to build a union station at Washington, on the site of the present Baltimore & Ohio station, instead of two separate terminals, as provided for by Congress at last session. It is understood that plans for a union station are being prepared and that Congress, at the next session, will be asked to sanction the change of plan. Briefly, it is for the Pennsylvania and Baltimore & Ohio tracks to connect near Bladensburg, and for all passenger trains to come into the new station, a tunnel under the Capitol grounds providing for southern connections, and the present Pennsylvania tracks to be used for freight. It is estimated that the change will cost between $12,000,000 and $15,000,000, of which the railroad companies will contribute $6,000,000.

MEETINGS AND ANNOUNCEMENTS.

(For dates of conventions and regular meetings of railroad associations and engineering societies see advertising page xvii.)

Western Society of Engineers.

At a meeting of the Western Society of Engineers in its rooms, Monadnock Block, Chicago, Wednesday evening, November 6, Mr. E. B. Ellicott presented an illustrated paper on "Protection of Water Pipe from Electrolysis." Mr. Ellicott is City Electrician of Chicago.

American Society of Civil Engineers.

At the meeting on Wednesday evening a paper by S. D. Rockenbach, entitled "The Waterworks of Guantanamo, Cuba," was presented. S. H. Adams, Assoc. M. Inst. C. E., described Bacterial Sewage Disposal as practiced in England, illustrating his remarks with original lantern slides, and the subject was afterwards discussed.

The Car Foremen's Association of Chicago.

The regular meeting of the Car Foremen's Association of Chicago will be held in Room 209, Masonic Temple, Chicago, Wednesday evening, Nov. 13, at 8 o'clock. The following programme has been arranged: Discussion of the new M. C. B. Rules, to be read section by section by the Secretary; report of committee appointed to design a suitable case for holding M. C. B. repair and defect cards.

1902 M. M. and M. C. B. Conventions.

The sub-committee representing the Master Mechanics' and Master Car Builders' associations and the railroad supply men, which consists of George W. West, of the New York, Ontario & Western; F. W. Brazier, of the New York Central, and F. A. Casey, of the Ashton Valve Co., will hold a meeting at Mr. Brazier's office in the Grand Central Station, New York City, Monday, Nov. 11, to consider proposals relative to the place of holding the next annual conventions of the mechanical associations. We have been requested to announce that the committee will be glad to receive suggestions from members of the associations and from the supply men, which will enable them to make a report that will be in accordance with the wishes of the largest number of those interested. The committee have propositions from hotels at different points and have had expressions of opinion from a limited number of those who attend the conventions, most of whom express a preference for Saratoga; but there are some earnest advocates of Old Point Comfort, and others who are in favor of Thousand Islands, Atlantic City and other resorts. Letters or telegrams on the subject should be addressed George W. West, at Middletown, N. Y.; F. W. Brazier, Grand Central Station, New York City, or to F. A. Casey, 271 Franklin street, Boston, Mass.

PERSONAL.

(For other personal mention see Elections and Appointments.)

—Mr. James P. Kennedy, a Director in the American Bridge Company, died at Youngstown, Ohio, Nov. 4. He was 39 years old.

—Mr. John Havron has been elected President of the Rogers Locomotive Works. Mr. Havron was for some time Secretary of the old Rogers Locomotive Works and resigned to accept a position with the Latrobe Steel Co.

—Major John Biddle, Corps of Engineers, U. S. Army, assumed his duties as Engineer Commissioner of the District of Columbia on Nov. 1, relieving Capt. Lansing H. Beach, Corps of Engineers, who has been ordered to duty at Detroit, Mich.

—Mr. Amos Green, at one time Vice-President and General Manager of the Quincy, Omaha & Kansas City, now known as the Omaha, Kansas City & Eastern, died Oct. 25, aged 86 years. Mr. Green was born in Wrightsville, Pa., Dec. 10, 1815.

—Mr. W. D. Duke, the General Manager of the Richmond, Fredericksburg & Potomac, was born Dec. 11, 1872. Mr. Duke's railroad experience dates from April, 1895, having been clerk and Secretary to the President up to the time of his recent promotion.

—Mr. Albert E. Mitchell, who recently resigned as Mechanical Superintendent of the Erie, has been appointed Assistant Superintendent of Motive Power of the Chicago, Milwaukee & St. Paul, to take effect Nov. 11. We shall say something more about Mr. Mitchell in a later issue.

—Mr. J. M. Herbert, the new Manager of the Denver & Rio Grande and the Rio Grande Western, assumed his new duties on Nov. 1. A short sketch of Mr. Herbert's life was given at the time of his appointment as General Superintendent of the St. Louis, Iron Mountain & Southern (Missouri Pacific) which will be found on page 245 in our issue of April 5.

—Mr. T. F. Whittelsey, General Manager of the Toledo Railway & Terminal Construction Company, is 45 years old, having been born at Richmond, Ky., March 19, 1856. Mr. Whittelsey started as a clerk in the freight office of the Lake Shore & Michigan Southern, remaining with this company as trackmaster and Division Superintendent, until March 13, 1893, when he became General Superintendent of the Toledo & Ohio Central. He resigned from this position on Sept. 10 this year, owing to the consolidation of the operating departments of the Hocking Valley & Ohio Central Railways.

—Mr. P. W. Early, who has been Division Engineer of the Tennessee Central since the 1st of October, is 36 years old. He began his railroad service as a chainman and transitman on the Fort Madison (Iowa) & Northwestern Railroad in 1880 and since then has passed through such positions, on various roads, as rodman, assistant resident engineer, levelman and engineman, until 1900, when he became Assistant Engineer Maintenance of Way of the Tennessee Construction Company at Lebanon, going from this position to the Tennessee Central, as stated above.

—Mr. Henry O. Bradley, of Osgood, Bradley & Sons, car builders, of Worcester, died Oct. 23, at his home in this city, after a short illness of pneumonia. Mr. Bradley was born in Worcester 73 years ago and was a son of Osgood Bradley, the founder of the Bradley car works, and for 20 years has been identified with the business as a member of the concern, being associated with his brother, Osgood Bradley, Jr., after the death of his father, in 1884. The Bradley car works, with which Mr. Bradley's name has always been identified, was started in Worcester more than one-half a century ago.

—Dr. Johann Georg von Siemens, founder of the Deutsche Bank, died in Berlin Oct. 23. This eminent German financier was a native of Torgau, where he was born in 1839. He was educated at Heidelberg and Berlin, and began the practice of law at an early age. His practice was interrupted by the campaigns in 1864, 1866, and 1870, in which he secured the decoration of the Iron Cross. When the Deutsche Bank was started, in 1871, Dr. von Siemens was selected to manage it. This he did for 30 years. Many railroads in the United States have been helped forward by this bank, notably the Northern Pacific.

—Mr. Charles N. Yeamans, for many years President and Superintendent of the New Haven & Northampton, and well known throughout New England, died at his home in Westfield, Mass., on Oct. 30, at the age of 65. Mr. Yeamans was connected with the road named and its predecessors, the Hampshire & Hampden and the Canal railroads, from his youth, his father having been one of the builders of the H. & H. and its Superintendent. Mr. Yeamans was appointed superintendent in 1859; in 1867 he was promoted to be Vice-President, and in 1874 became President. In 1887 the road was leased to the New York, New Haven & Hartford, since which time his duties have been only nominal.

—Mr. Benjamin Johnson, heretofore Engineer of Tests of the Atchison, Topeka & Santa Fe, on Nov. 1, became Superintendent of Motive Power and Machinery of the Mexican Central, succeeding Mr. F. W. Johnstone. Mr. Johnson entered the service of the "Santa Fe" as a machinist in 1879, and remained in the locomotive department in various capacities until 1888, when he resigned to go with the Westinghouse Air-Brake. In 1898 he returned to the "Santa Fe" as Division Master Mechanic, and since June, 1900, he has been Engineer of Tests. Our acquaintance with Mr. Johnson when he was a Westinghouse air-brake expert, and later, when he was under high pressure as a motive-power man, showed that he has an evenness of disposition, a ready insight of affairs, and physical endurance to a degree that will make for success in his work on the Mexican Central. A brief sketch of his life appeared in our paper last year, page 433.

—Mr. Walter R. Woodford, who, on Friday, Nov. 1, assumed the duties of General Superintendent of the Pittsburgh Division of the Baltimore & Ohio Railroad, is a native of New York, having been born at Dunkirk, Nov. 9, 1857. When but 15 years of age he began his railroad career as a clerk in the Superintendent's office of the Great Western of Canada. Then, for one year, 1874 to 1875, he held a similar position on the Detroit & Milwaukee. In 1880 he was appointed chief clerk and Purchasing Agent of the Fort Wayne & Jackson, and two years later became Purchasing Agent of the Wheeling & Lake Erie; then Assistant General Manager and later General Superintendent. On Oct. 1, of this year, after the acquirement of the controlling interest of the Cleveland, Lorain & Wheeling by the Baltimore & Ohio, Mr. Woodford became the Vice-President and General Manager, which position he now holds, and in addition to this position, the title remaining the same, he will assume the duties of General Superintendent of the Pittsburgh Division of the Baltimore & Ohio.

ELECTIONS AND APPOINTMENTS.

Atchison, Topeka & Santa Fe.—C. M. Taylor, heretofore Division Master Mechanic at La Junta, Colo., has been transferred to a similar position at Raton, N. Mex.

Baltimore & Ohio.—S. B. Mason, heretofore Assistant to Mechanical Superintendent, has been appointed Assistant to the General Superintendent of Motive Power. E. T. White, heretofore Assistant Mechanical Superintendent, has been appointed Superintendent of Motive Power, Lines East of the Ohio River, and W. S. Haines, Assistant Mechanical Superintendent at Newark, Ohio, becomes Superintendent of Motive Power, Lines West.

Central Vermont.—Wm. Hassman having resigned, T. A. Summerskill, heretofore Division Master Mechanic of the Grand Trunk, has been appointed Superintendent of Motive Power of the C. V., with headquarters at St. Albans, Vt., effective Nov. 1.

Chicago Great Western Railway.—C. P. Cogswell, Jr., has been appointed Acting Division Engineer of the Fort Dodge Division, with headquarters at Fort Dodge, Iowa. W. F. Mahoney becomes Roadmaster. Effective Nov. 1.

Chicago, Milwaukee & St. Paul.—Albert E. Mitchell, heretofore Mechanical Superintendent of the Erie, has been appointed Assistant Superintendent of Motive Power of the C., M. & St. P., effective Nov. 11.

G. R. Morrison, heretofore Trainmaster, has been appointed Division Superintendent, with headquarters at Savannah, Ill.

Cleveland, Cincinnati, Chicago & St. Louis.—W. H. Newman and W. F. Bliss have been elected Directors, succeeding G. A. Farlow and the late G. T. Bliss.

Colorado & Southern.—H. F. Parke, Superintendent of Transportation, has resigned, and this position has been abolished. R. F. Watkins has been appointed Superintendent of Car Service, with headquarters at Denver.

Detroit Southern.—F. E. Dewey, General Superintendent, was, at his own request, relieved of duty Nov. 1. Officers heretofore reporting to him will, until further notice, report to Samuel Hunt, President.

Houston East & West Texas.—C. H. Tweed has been elected Chairman of the Board and President, succeeding J. A. Blair and T. W. House. N. S. Meldrum, General Manager, has been elected Vice-President, also.

Illinois Central.—A. S. Baldwin, heretofore Roadmaster of the Louisville & Nashville, has been appointed Principal Assistant Engineer of the I. C., with headquarters at Chicago, Ill.

Mexican Central.—Benjamin Johnson, heretofore Engineer of Tests of the Atchison, Topeka & Santa Fe, has been appointed Superintendent of Motive Power and Machinery of the M. C., succeeding F. W. Johnstone, effective Nov. 1.

A. C. Hobart, heretofore Trainmaster, has been appointed Division Superintendent, succeeding H. R. Cornforth, resigned. J. F. Casey, heretofore Trainmaster, has been appointed Acting Division Superintendent, succeeding G. F. Hawks, Division Superintendent, resigned.

Northern Pacific.—C. S. Bihler, Division Engineer, with headquarters at Tacoma, Wash., has resigned.

Pittsburgh Junction.—F. T. Hyndman, Master Mechanic of the Pittsburgh & Western, has been appointed Master Mechanic of the P. J., with headquarters at Glenwood, Pa., succeeding I. N. Kalbaugh.

St. Joseph & Grand Island.—R. Du Puy, General Manager, has been elected Vice-President also.

Seaboard Air Line.—The title of E. D. Kyle, Division Freight Agent at Jacksonville, Fla., has been changed to Assistant General Freight Agent.

Southern Pacific.—G. F. Richardson has been appointed Superintendent of Transportation, in addition to his duties as Master of Transportation. J. D. Isaacs, Assistant Engineer Maintenance of Way (Pacific System) in addition to his present duties, will perform such others as may from time to time be assigned to him. W. W. Slater has been appointed Signal Engineer. All with headquarters at San Francisco.

Toledo, St. Louis & Western.—J. D. Brennan has been appointed Acting Superintendent, temporarily.

Wabash.—W. D. Holliday, heretofore Assistant General Freight Agent of the Cleveland, Cincinnati, Chicago & St. Louis, has been appointed Assistant General Freight Agent of the Wabash.

Wheeling & Lake Erie.—J. E. Taussig has been appointed Superintendent and Superintendent of Telegraph, with headquarters at Canton, Ohio; C. A. Van Dusen becomes Assistant Superintendent of the Cleveland Division, at Canton; H. W. McMaster, Assistant Superintendent of the First and Third Districts, Toledo Division, at Toledo; and K. M. Nicoles, Assistant Superintendent of the Second and Fourth Districts, Toledo Division, at Columbia, Ohio, effective Nov. 1.

RAILROAD CONSTRUCTION.

New Incorporations, Surveys, Etc.

ABERDEEN & ROCKFISH.—Surveys are reported for an extension of this line, now in operation between Aberdeen and Rock Fish, N. C., 33 miles south, beyond Fayetteville, and it is thought that work will be begun at once.

Atlantic, Valdosta & Western.—At a meeting of the directors resolutions were passed to the effect that it would be to the best interest of the company to extend its line from Valdosta, in Lowndes County, Ga., to the Chattahoochee River, at some point on the western line of the State, passing through Lowndes, Brooks, Colquit, Worth, Mitchell, Dougherty, Lee, Terrell, Webster, Randolph, Stewart and Quitman counties, a distance of about 140 miles. (Construction Supplement, Oct. 11, 1901.)

Bartow & Plant City.—An officer writes that preliminary surveys have been made and prospects of immediate building are good for this new railroad in Florida, running from Plant City, on the north, to Bartow and Fort Meade, by way of important phosphate mines in Polk County. It is thought that contracts will be let some time within the next 30 days. The officers are as follows: President, Clarence A. Boswell; Vice-President, Solon G. Wilson; General Manager, Edward C. Stuart; Treasurer, Warren Tyler; Secretary, George E. Simpson.

Battle Creek & Marshall.—See under Gordon Traction Co.

Buffalo, East Otto & Cattaraugus (Electric).—An officer writes that the contracts for building and equipping this projected electric line from Hamburg, N. Y., to Cattaraugus, by way of East Otto and other intervening towns, a total of 38 miles, have been made. (May 24, p. 357.)

California Roads.—Surveys are reported for a new timber line to run from Shaver, Fresno County, Cal., 12 miles back into timber land. At present only four miles are to be built. The Fresno Flume & Irrigation Co. are the builders.

Chicago, Burlington & Quincy.—It is said that a line will be completed from Mystic, S. Dak., to Rapid City, 22 miles east. By this extension connection will be secured with the projected air line from Aberdeen and Pierre, N. Dak., to Rapid City.

Chicago, Rock Island & Pacific.—It is said that contracts will be let for the proposed Kansas City cut-off between Eldon, Iowa, and Trenton, Mo., during the coming week. The new line will be 85 miles long and will shorten the distance between Chicago and Kansas City 35 miles, and also do away with a number of grades and curves. (Construction Supplement, Oct. 11, 1901.)

Elmira & Waverly (Electric).—This company has been incorporated in New York State to build an electric road about 18 miles long between the city of Elmira and the village of Waverly. The capital stock is $200,000, and the directors live in Elmira.

Florence, Iron, Phosphate & R. R.—A company by this name, with a capital stock of $100,000, has been incorporated in Kentucky to build a railroad in the States of Kentucky, Tennessee and Alabama, for the purpose of opening up mineral and phosphate lands. It is the present intention of the incorporators to build as far as the Tennessee line, Wayne County, Tenn., which is about 15 miles north of Florence, and it is thought that work will be begun in 60 days. The incorporators are: W. J. O'Hearn, Joseph Kothmen, Peter Arlund, T. B. Leonard, G. T. Rider, Henry W. Imorde and James B. Smith.

Great Northern of Canada.—An officer writes in regard to this company's proposed extension from Ste. Catharines, on the line of the Quebec & Lake St. John, to the Great Northern line at Garneau Junction, five miles east of Grand Mere, that surveys are completed. The work is through sand and gravel and is easy, with maximum grade opposed to eastbound traffic .6 per cent. compensated, and opposed to westbound traffic 1 per cent. compensated. The maximum curvature is 4 deg. The total length of the line, which will shorten the distance between Quebec and Garneau Junction, is 58 miles. For a description of bridge work, see Bridge Building.

Gordon Traction.—This company has been incorporated in Michigan, to build an electric road 50 miles long from Battle Creek to Lansing. The officers of the company are: R. B. Gordon, President, St. Mary's, Ohio; O. A. Hertzing, Vice-President, St. Mary's, Ohio; C. A. Douglas, Secretary, and C. W. Sellers, Treasurer, both of Battle Creek.

Gulf & Interstate.—The portion of this line between White's Ranch and High Island, Texas, eight miles, which was destroyed by the Texas storm, is to be rebuilt at once by A. F. Lucas, and contracts have been let to the firm of Noon & Crowley for the work. (Construction Supplement, Oct. 11, 1901.)

Houston & Texas Central.—Surveys are reported completed for the proposed extension of the Austin & Northwestern branch of this line from Burnet, Texas, to Lampasas, a distance of about 30 miles. Material to be used in construction is arriving at Burnet. The extension when completed will connect with the Gulf, Colorado & Santa Fe at Lampasas. The Houston & Texas Central is a part of the Southern Pacific system. (March 15, p. 194.)

Laramie, Hahn's Peak & Pacific.—An officer writes that grading has been completed on this new railroad in Wyoming for a distance of nearly 20 miles west of Laramie, on the First Division of its line to Centennial, Wyo. The distance between Laramie and Centennial is about 32 miles in a westerly direction. (Construction Supplement, Oct. 11, 1901.)

Long Island R. R.—This company has awarded contracts to the extent of $989,665 for getting its tracks off grade on Atlantic avenue, in Brooklyn. The contract for furnishing the steel to be used in the two viaduct sections between Bedford and Ralph avenues, between Shepherd avenue and Manhattan crossing, and for the underground work, was awarded to the American Bridge Co., a branch of the U. S. Steel Corporation, for $870,000. Contract for two abutments to form the approaches to the viaducts in the Twenty-sixth Ward, and for the foundations for viaduct columns in that ward, was let to John McNamee, of Brooklyn, for $76,165. This contract calls for work to be completed before the regular summer time-table of the Long Island road goes into effect next year, and contracts for the remainder of the work, including the foundation and masonry of the viaduct or elevated section between Nostrand and Ralph avenues, will be let the first week in December. It is estimated that the entire work, which will be completed in two years, will cost $3,500,000, of which the city will pay $1,250,000.

Louisiana & Northwest.—It is said that this company is now making contracts for an extension 38 miles long, from the present terminus of the road near Bienville, Ark., to Natchitoches, La.

Manistee, Filer City & East Lake (Electric).—This company, which operates an interurban road 14 miles long, reports surveys finished to build an additional 20 miles to Onekama and Bear Lake, Mich. It is said that contracts will soon be let.

Morgantown & Kingwood.—It is said that this company has let the contract for an extension of its present line from its terminus at the Preston County line in West Virginia to Reedsville, six miles distant. The Morgantown & Kingwood is projected 26 miles between the points named, and 12 miles are at present completed. (Construction Supplement, Oct. 11, 1901.)

North Carolina Roads.—It is reported that the Beaufort Lumber Co. has commenced work on its 25-mile line from Greenville southeast to Vanceboro. (Construction Supplement, Oct. 11, 1901.)

Northern Pacific.—Surveys are reported from Mackenzie, N. Dak., southwest in the direction of Fort Yates. The surveyors are now working between Mackenzie and Glencoe, and the total length of their projected line to Fort Yates is about 50 miles.

Norton & Pound River.—It is reported that this new line between Norton, Va., and coal fields in Boone County, Ky., is being completed up to a point near Pound Gap, Ky., about 20 miles from Norton.

Rumford Falls & Rangeley Lakes.—The directors of this company have petitioned the Railroad Commissioners in Maine for permission to extend their line from Bemis 22 miles north to Kenebago Lake, which involves building around the end of the Rangeley Lakes. They ask that permission be given them to increase their capital stock from $150,000 to $500,000 to permit this extension and for other work of construction and betterment.

St. Louis & San Francisco.—Surveys are reported for an extension of this line between Mansfield and Waldron, Ark., 20 miles, and it is said that grading will begin as soon as they are completed.

St. Louis Southwestern.—An amendment has been filed to this company's charter in Texas providing legally for the four extensions which have been for some time under consideration, i.e., from Renner to Dallas, Texas, 13 miles; from Hillsboro to Whitney, Texas, 13 miles; from Gatesville to Hamilton, 32 miles, and from Lufkin to a point on the Sabine River, in Newton County, 90 miles. It is said that work on these extensions will be begun immediately.

Salem, Falls City & Western.—A company by this name has been incorporated in Oregon to build a railroad between Salem, in Marion County, and the mouth of the Siletz River, in Lincoln County, a distance of about 75 miles through timber land. The authorized capital is $100,000, and the incorporators are: Geo. T. Gerlinger, Louis Gerlinger and Geo. W. Stapleton.

Sioux Falls Interurban & Traction.—Articles of incorporation were filed, Oct. 22, in South Dakota, for an electric line 60 miles long to connect Sioux Falls with Madison. The capital stock is $1,000,000 and the incorporators live in Sioux Falls, Toledo and Chicago. An incorporation in June, 1900, under the name of the Sioux Falls & Northwestern, covered the same ground between Sioux Falls and Madison, but nothing has been done with it and it is thought that this is a re-incorporation of the portion of the original line which it is proposed to build.

Southern.—It is reported that the three-mile extension from Gamble's Store, Tenn., to the gap in the mountains, will be completed within a month. An additional extension 20 miles long may be made on this line into the timber district. These extensions are on the Knoxville & Augusta branch.

Sunset.—Grading and track laying is reported completed on this line in California from Bakersfield, on the Atchison, Topeka & Santa Fe, 28 miles southwest to Sunset. Some work in leveling and filling still remains, however, and trains will not be run on schedule for some time. (Construction Supplement, Oct. 11, 1901.)

Union Springs & Northern.—An officer writes in regard to this proposed line in Alabama from Fort Davis to Union Springs, and from Fort Davis to Birmingham, that no contracts have as yet been let, but that they will be within 30 days. W. M. Blount, of Union Springs, is President, and G. S. Burtchall, Engineer. The total length of line proposed is about 120 miles. (Construction Supplement, Oct. 11, 1901.)

Washington & Oregon.—An officer writes in regard to this company, incorporated in 1900, to build between Portland, Ore., and Seattle, Wash., that 29 miles is now under construction between Vancouver and Kalama, Wash. The maximum grade is 0.4 of 1 per cent.; maximum curvature 5 deg., and only two curves on the line are as high as that. Twenty miles of track has been laid with 72-lb. rails and partially ballasted. The work includes nine concrete arch culverts, ranging in size from 6 to 10 ft., and two steel bridges, one 825 ft. long across Lewis River, and one 150 ft. long across Salmon Creek. The Portland Bridge & Building Co., of Portland, Ore., has the contract for all concrete work and for the erection of the steel, and the railroad company is doing its own grading and track laying. Three locations for the continuation of the line between Vancouver, Wash., and Portland, Ore., have been made, but no route has as yet been chosen.

GENERAL RAILROAD NEWS.

Atchison, Topeka & Santa Fe.—It is said that the purchase of the Kansas Southwestern, recently credited to this company, was made in conjunction with the St. Louis & San Francisco, and that these two companies hold the Kansas Southwestern in joint ownership. The line in question runs between Cale Junction and Anthony, Kan., a distance of 59 miles, and the cost of purchase is said to have been $360,000. The traffic over this line is to be divided equally between the two owning companies.

Baltimore & Ohio.—Commencing Nov. 17, it is announced that the Baltimore & Ohio Southwestern will reduce the running time 1 hour and 5 minutes between Cincinnati and St. Louis. The reduction of time is made possible owing to the extensive betterments of the line in the past two years, including the straightening of curves and reduction of grades. The distance on the B. & O. line between these two cities is 342 miles, and the present running time with the fastest trains, 9 hours and 40 minutes.

Bradford, Bordell & Kinzua.—The Pittsburgh & Western Co. has leased to the above railroad that portion of its line between Foxburgh, Pa., and Ormsby Junction. The line is 104 miles long and is narrow gage, and the Pittsburgh & Western is leasing it temporarily to the above narrow gage connecting line rather than re-equip it. The lease is for a short time only and the line will sooner or later be taken over and made standard gage.

Cane Belt.—This company has issued bonds to the extent of $693,000 on its 69 miles of road thus far completed from Sealy to Bay City, Texas; $355,000 of these are to be used to take up an old mortgage outstanding against the road.

Chesapeake & Ohio.—It is reported that this company has purchased terminals in Cincinnati, Ohio, from the Kineon Coal Co. The terminals in question are under lease to the above road until 1904, and are acquired for the company's coal business. The Chesapeake & Ohio will assume the $200,000 outstanding debt of the company, and also pay in cash $150,000 to the Kineon Company's stockholders. A sinking fund is provided to redeem the bonds that fall due in 1905.

Chicago Great Western.—On Nov. 1 this company commenced operating the Mason City & Fort Dodge as a part of its Fort Dodge Division. It has previously controlled the Mason City & Fort Dodge, which extends from Mason City to Lehigh, Iowa, 88 miles, but had operated it as an independent organization.

Columbus, Lima & Milwaukee.—This property was ordered sold in foreclosure by the Circuit Court at Defiance, Ohio, on Oct. 26. It is a new railroad which was projected from Columbus, 285 miles northwest to Saugatuck, Mich., by way of Lima and Defiance, and at last reports track was laid between Lima and Defiance, 40 miles, and building was in progress from Lima by way of Lake View to Peoria, 55 miles. (See Construction Supplement, Oct. 11, 1901.)

Concord & Montreal.—Application has been made to the Railroad Commissioners of New Hampshire for authority to issue $500,000 of bonds to provide for building the Concord, Manchester & Nashua Electric R. R. between Manchester and Concord. The grading work on this line is now practically completed.

Detroit, Pontiac, Lapeer & Northern Electric.—A mortgage for $3,000,000 has been filed to the Morton Trust Co., trustee, to provide for building this proposed line north from Detroit through Pontiac, Oxford and Lapeer to Bay City, Mich., 125 miles. (See under Detroit, Pontiac, Lapeer, Caro & Bay City, Construction Supplement, Oct. 11, 1901.)

Little Kanawha.—This road is reported sold to Stephen B. Elkins, representing a syndicate, for $1,250,000, of which $1,000,000 was paid down and the remainder is to be paid Nov. 10. The Little Kanawha extends from Parkersburg to Palestine, W. Va., 30 miles, and was chartered in 1896, to build as far as Burnsville, which is 112 miles from Parkersburg. It is said that the present purchasers will continue the line from its present eastern terminus.

Mexican Central.—This company is placing, through F. S. Moseley & Co., of Boston, an issue of 4¾ per cent. six months' notes, payable at the National Shawmut Bank in Boston. They will be secured by consolidated mortgage 4 per cent. gold bonds of the company and the proceeds are to be used in payment for the Monterey & Mexican Gulf R. R.; $500,000 of the notes are now on the market as part of a total issue of $6,000,000, of which over $3,000,000 have been sold already, and they are secured by $9,250,000 bonds.

New York, New Haven & Hartford.—The Railroad Commissioners of Massachusetts have authorized an issue of $150,000 additional capital by the Old Colony Railroad (1,500 shares). The proceeds are to be used for a branch or extension from the North Attleboro station to a point near Adamsdale on the road of the Rhode Island & Massachusetts Railroad. The proposed increase does not exceed 4 per cent. of the existing capital stock of the petitioners. The directors will dispose of the stock at auction.

Northwest.—This property, which consists of 12 miles of graded road and several tunnels along the projected line between Huntington, Ore., and Lewiston, Idaho, was sold for $35,000 at Baker City, Ore., on Oct. 18, to Charles M. Reed, of Erie, Pa., who was a large creditor of the company. The line was projected from Nagle, Ore., to Tronne Junction, 73 miles north, and some work was done on it in 1899. Orman & Crook, of Pueblo, Colo., were the contractors.

Pennsylvania.—This company is said to have purchased, for $1,000,000, the Ligonier Valley R. R., which runs from Latrobe to Ligonier, Pa., 11 miles. Its general balance sheet in June, 1900, showed capital stock of $160,000, funded debt of $75,000 and profit and loss $66,847, against cost of road and equipment $248,449, and cash and current assets $17,398.

Rutland.—A certificate of consolidation of the Ogdensburg & Lake Champlain with this company, under the name of the Rutland Company, was filed Oct. 28, at Albany, N. Y., with the Secretary of State. The capital stock is $8,766,000. The Ogdensburg & Lake Champlain operates a total of 159 miles of track and has outstanding $4,400,000 first mortgage 5 per cent. gold bonds of July, 1948, which have been guaranteed, principal and interest, by the Rutland.

Springfield & Decatur.—An issue of bonds has been authorized by this company in connection with the extension they are building of the Indiana, Decatur & Western, from Decatur to Springfield, 42 miles.

Springfield, Jefferson City & Chicago.—This company has filed a mortgage in the Recorder's office of Green County, Mo., to secure $5,500,000 40-year 5 per cent. bonds in connection with the work on their line from Springfield, Mo., to some point on the Missouri River.

Southern Missouri & Arkansas.—This company is reported to have purchased the Hoxie, Pocahontas & Northern, which is a coal road 15 miles long between the points named in Arkansas.

Union Pacific.—The report for the month of September shows that gross receipts were $4,240,814, as opposed to $4,054,848 last September, an increase of $185,966. The expenses, however, decreased from $2,232,078, the 1900 figure, to $2,191,873, in spite of the fact that 5,755 miles of road were operated, an increase of 76 miles over the figure for September, 1900.

Wisconsin, Minnesota & Pacific.—The Winona & Western filed a deed, on Oct. 12, to this company, for $1,350,000, calling for its entire property, including lands, tracks, bridges, warehouses, stations, etc. The Winona & Western was projected from Winona, Minn., to Omaha, about 380 miles, and was completed on June 30, 1899, as far as Osage, Iowa, 113 miles.